

NOVEMBER 1, 1961

# AUTOMOTIVE INDUSTRIES

ENGINEERING

MANAGEMENT

PRODUCTION

DESIGN

A CHILTON PUBLICATION

"INSIDE"

SEE PAGE

42

## PURCHASING

AT CHRYSLER CORPORATION

ALSO IN THIS ISSUE

PONTIAC'S SETUP  
FOR RELIABILITY

NEW TECHNIQUES  
AT FORD FOUNDRIES

MACHINE TOOL  
BUILDERS SURVEY

ALLIS-CHALMERS'  
NEW ENGINE PLANT

B. W. Bogan

Vice-President Purchasing  
Chrysler Corporation

SEE PAGE 42





**250,000 full turns**, more than a lifetime of service, and the amount of wear on ratchet drive lugs, or tangs, is practically unnoticeable. Corners remained sharp and clean and the surface unmarred.

What kind of steel does New Britain specify for these vital parts? What kind of steel offers this combination of high torque strength, high surface resistance to wear and Brinelling, plus uniform machinability? An alloy steel, of course . . . Aristoloy 4150 to be specific.

Write today for complete information about Aristoloy alloy steels in leaded and unleaded grades. Ask for Product and Facilities Catalog or call your nearest Copperweld representative.

## **Wear-Proof Tangs... Alloy Steel of course**



**COPPERWELD  
STEEL COMPANY**

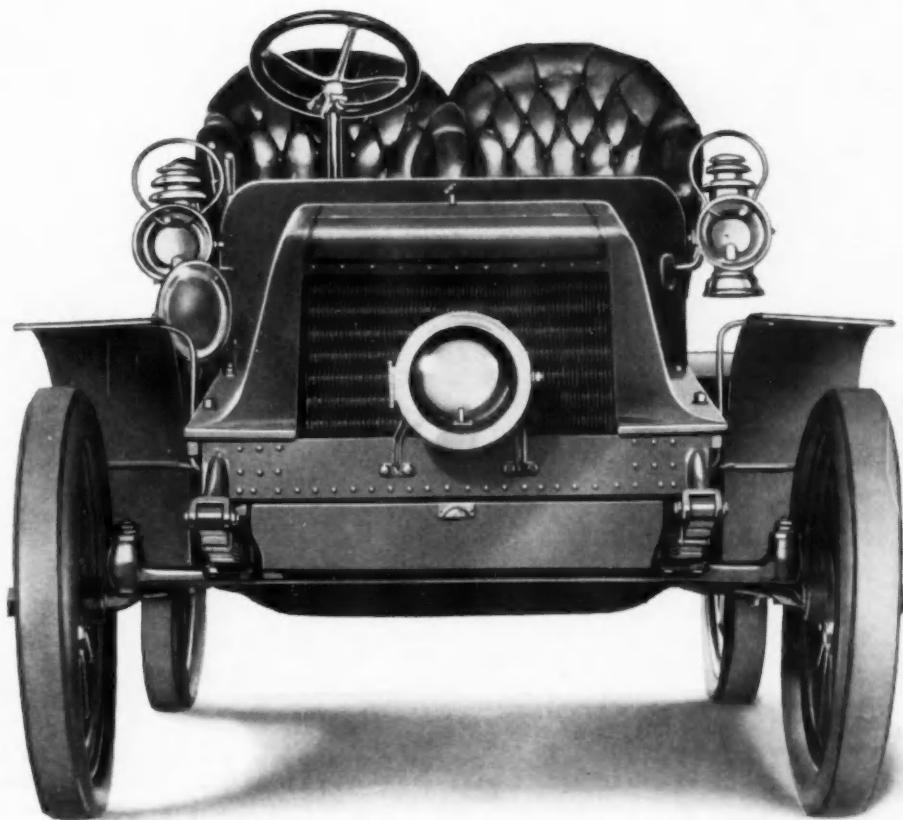
ARISTOLOY STEEL DIVISION



4025 Mahoning Ave., Warren, Ohio • EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

# *The Winton Runabout*

"THERE'LL • NEVER • BE • A • FINER • MOTOR • CAR"



20-horsepower; horizontal double opposed, 2-cylinder engine; transmission by friction clutch; chain drive; 2,250 lbs.; Timken bearing equipped. Price: \$2500

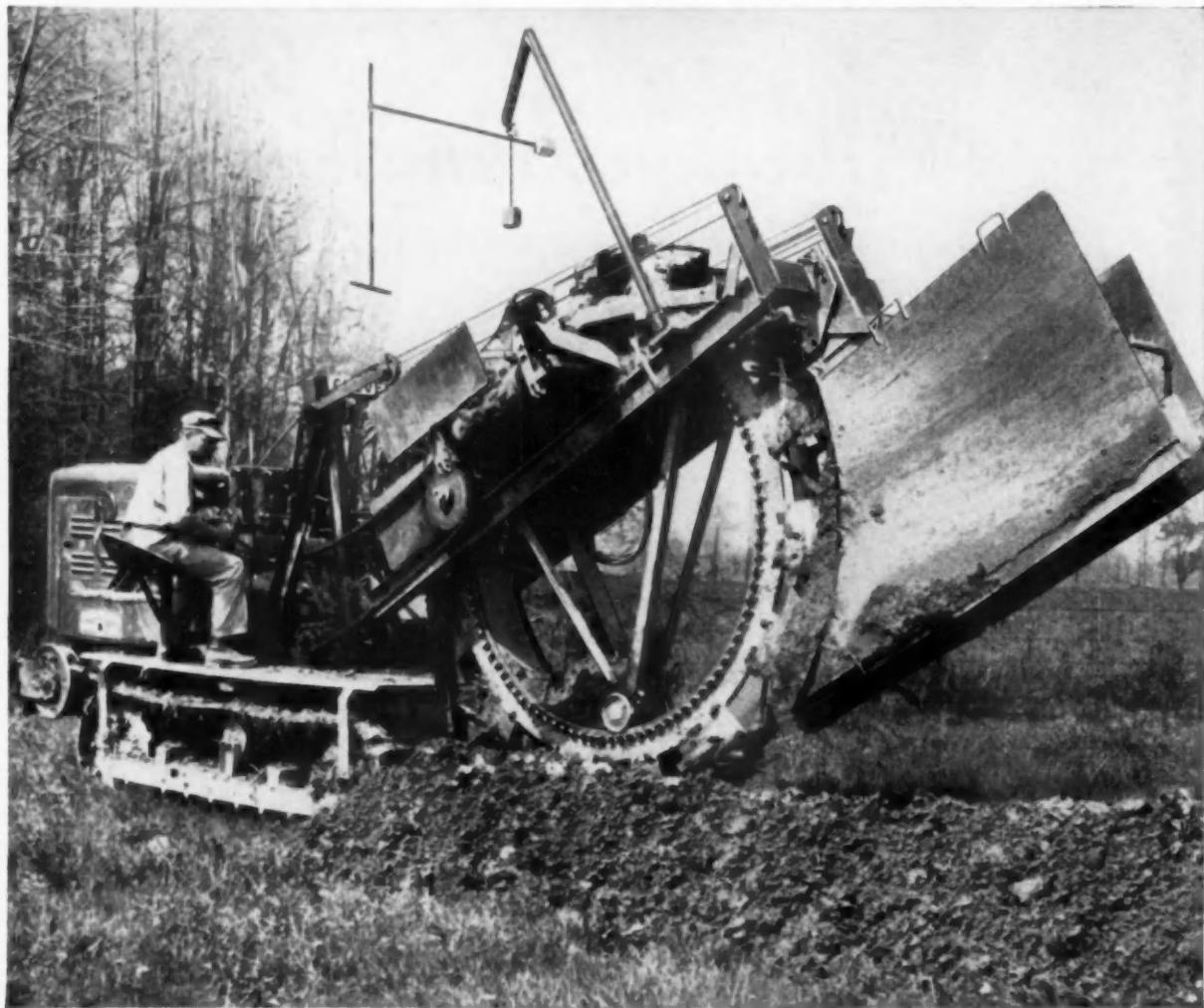
PHOTOGRAPHED AT THOMPSON MUSEUM IN CLEVELAND, OHIO

## **Everything's changed but the name on the bearings**

Speedy, stylish, solid—America was left breathless as the Winton swept by in its cloud of dust and blue smoke back around '03 and '04 ■ It's hard to say if the Winton ever lived up to its proud slogan—but the engineers tried. They called on the Timken Company, as did most vintage car makers, for bearings that would keep wheels and shafts turning with a minimum of friction ■ Today automotive engineers want smaller bearings to create lower silhouettes and more compact mountings. Capacity-packed and reliable to extend warranty periods. Because engineers know they get the most from the Timken Company, every make of American car but one uses Timken® tapered roller bearings. Make sure your next one does. For a free 10" x 11" print of the Winton, suitable for framing, write: The Timken Roller Bearing Company, Dept. AD, Canton 6, Ohio. Also makers of Fine Alloy Steel and Rock Bits.



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TAPERED ROLLER  
BEARINGS • Since 1899



## Digs 1,000,000 feet of trench without a breakdown— proof of 4340 nickel steel's strength and toughness!

*This through-hardening nickel alloy steel is used in this Cleveland Trencher's traction-output shafts, final-drive countershafts, and digging-wheel lower-truck shafts. Operating loads hit 150,000 psi. AISI 4340 takes these loads in stride—day after day after day!*

When this Cleveland Model J-30 Trencher, owned by Mr. Howard Zacharias of Wellington, Ohio, is on the job, components in this trencher have to stand up to operating loads of 150,000 psi. Imagine the shock-loads that occur when the buckets come cracking through the ground—hitting rocks, roots, and buried metal.

With high operating loads, with the constant threat of severe shock loads, designers of the Cleveland Trencher, Model J-30, selected 4340 nickel alloy steel for this trencher's important components—traction output shafts, final-drive countershafts,

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**4340 pays off in trouble-free performance.** Made of a reliable through-hardening steel—strong and tough all the way through—these medium-to-heavy-sectioned parts deliver the abrasion and wear resistance needed for earth-moving service.

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NICKEL MAKES STEEL PERFORM BETTER LONGER

# AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE • PUBLISHED SEMI-MONTHLY

NOVEMBER 1, 1961

VOL. 125, No. 9

Passenger Cars • Trucks • Buses • Aircraft • Tractors  
• Engines • Bodies • Trailers • Road Machinery •  
Farm Machinery • Parts and Components • Accessories  
• Production and Processing Equipment •  
Design • Production • Engineering • Management

## Features • • •

### ▼ How Suppliers Cooperate In Pontiac Reliability Program

The Pontiac Division of General Motors Corporation has, in operation, one of the most completely developed "Reliability Assurance" programs in the industry. The program became effective in early 1961, and was used in quality control of 1962 parts.

Page 37

### ▼ "Inside Purchasing" at Chrysler Corporation

Presented here is a comprehensive description of the current organization and operation of the purchasing staff at Chrysler Corporation. Under the setup, all purchases of a certain dollar value must ultimately clear through the corporate level, and no buys can be made until there is concurrence from the central office.

Page 42

### ▼ New Techniques at Ford's Foundries

Ford Motor Co. has introduced some special techniques in its gray iron foundries which result in a major reduction in weight of components such as cylinder heads, blocks, and manifolds.

Page 46

### ▼ Machine Tool Builders Report Improvements in Business Situation

Moderate gains in order backlogs and inquiry were reported by a representative group of machine tool builders at the end

of the 3rd Quarter. At the same time, they predicted that new business would increase during the 4th Quarter of 1961 and the 1st Quarter of '62.

Page 49

### ▼ New Allis-Chalmers Engine Plant—Part II

Features of the new engine plant opened recently by Allis-Chalmers were described in the September 15 issue of AUTOMOTIVE INDUSTRIES. Part II is devoted to cylinder blocks, engine assembly, and engine testing.

Page 51

### ▼ High Performance Minicar

The Morris Mini-Cooper is a high-performance version of the British Motor Corporation's ADO 15 (Morris and Austin 850). The engine's stroke has been increased, and other improvements made.

Page 57

### ▼ How to Design Die Stamped Circuits

Die stamped circuits are made by die-cutting the conductor pattern from metal foil coated on one side with a thermo-responsive adhesive, and simultaneously bonding the circuit to the insulating base material under heat and pressure.

Page 58

### ▼ 17 New Product Items and Other Features Such As:

News of the Machinery Industry; Industry Statistics; and News of the Automotive and Aviation Industry.

... continued on next page

MEMBER



National Business Publications, Inc.



Business Publications Audit of Circulation

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HT-413

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## 30 CHRYSLER INDUSTRIAL ENGINE MODELS (24 Gasoline; 6 Chrysler-Peugeot Diesel)

MODEL (Gasoline)	NO. CYL.	DISP. (Cu. In.)	WEIGHT (lbs.)	GROSS TORQUE (FL. Lbs.)			GROSS HORSEPOWER			CONTINUOUS H.P. @ recommended rpm*
				@ 1200 rpm	MAX.	@ Rated rpm*	@ 1200 rpm	@ Peak Torque	Rated*	
H-170	6	170	420	148	150 @ 1600	136 @ 4000	34	46 @ 1600	104 @ 4000	48 @ 2800
HB-170	6	170	420	148	150 @ 1600	136 @ 4000	34	46 @ 1600	104 @ 4000	48 @ 2800
HC-170	6	170	420	148	150 @ 1600	136 @ 4000	34	46 @ 1600	104 @ 4000	48 @ 2800
IND. 30	6	230	575	190	190 @ 1200	144 @ 3600	43	43 @ 1200	99 @ 3600	73 @ 2800
IND. 31	6	230	610	190	190 @ 1200	144 @ 3600	43	43 @ 1200	99 @ 3600	73 @ 2800
IND. 931†	6	230	610	179	180 @ 1500	156 @ 3200	41	48 @ 1500	95 @ 3200	73 @ 2800
IND. 32	6	265	740	225	225 @ 1200	175 @ 3600	51	51 @ 1200	120 @ 3600	88 @ 2800
IND. 33	6	265	760	225	225 @ 1200	175 @ 3600	51	51 @ 1200	120 @ 3600	88 @ 2800
IND. 908A†	6	251	760	196	197 @ 1300	167 @ 3200	45	49 @ 1300	101 @ 3200	78 @ 2800
H-225	6	225	475	204	204 @ 1200	157 @ 4000	47	47 @ 1300	119 @ 4000	61 @ 2800
HB-225	6	225	475	204	204 @ 1200	157 @ 4000	47	47 @ 1300	119 @ 4000	61 @ 2800
HC-225	6	225	475	204	204 @ 1200	157 @ 4000	47	47 @ 1300	119 @ 4000	61 @ 2800
H-318	8	318	550	256	269 @ 2400	246 @ 4000	60	125 @ 2400	187 @ 4000	84 @ 3200
HB-318	8	318	550	256	269 @ 2400	246 @ 4000	60	125 @ 2400	187 @ 4000	84 @ 3200
HC-318	8	318	550	256	275 @ 2400	252 @ 4000	62	130 @ 2400	191 @ 4000	90 @ 3200
HT-318	8	318	550	258	275 @ 2400	250 @ 4000	60	125 @ 2400	190 @ 4000	96 @ 3200
H-361	8	361	610	299	326 @ 2400	275 @ 4000	69	149 @ 2400	210 @ 4000	101 @ 3200
HB-361	8	361	610	314	334 @ 2400	265 @ 4000	70	151 @ 2400	205 @ 4000	110 @ 3200
HC-361	8	361	610	311	335 @ 2400	290 @ 4000	73	155 @ 2400	218 @ 4000	110 @ 3200
HT-361	8	361	710	316	336 @ 2000	262 @ 4000	72	128 @ 2000	200 @ 4000	142 @ 3200
H-413	8	413	625	346	384 @ 2600	324 @ 4000	82	190 @ 2600	248 @ 4000	127 @ 3200
HB-413	8	413	625	342	370 @ 2400	290 @ 4000	76	170 @ 2400	218 @ 4000	160 @ 3200
HC-413	8	413	625	345	394 @ 2400	333 @ 4000	87	183 @ 2400	255 @ 4000	160 @ 3200
HT-413	8	413	730	344	372 @ 2000	284 @ 4000	78	142 @ 2000	215 @ 4000	154 @ 3200
Four 99	4	99	330	73	82 @ 2100	69 @ 4000	17	32 @ 2100	52 @ 4000	34 @ 3000
Three 144	3	144	456	120	120 @ 1250	100 @ 2400	27	29 @ 1250	45 @ 2400	33 @ 2000
Four 203	4	203	520	163	164 @ 1000	120 @ 3000	39	32 @ 1000	71 @ 3000	47 @ 2000
Four 270	4	270	722	222	223 @ 1300	210 @ 2000	51	55 @ 1300	80 @ 2000	57 @ 2000
Six 305	6	305	702	242	247 @ 1000	176 @ 3000	57	37 @ 1000	102 @ 3000	71 @ 2000
Six 354	6	354	836	300	336 @ 1500	245 @ 2800	70	88 @ 1500	130 @ 2800	85 @ 2000

\* Send for detailed specifications, power charts, installation drawings on any model.

\*Ratings shown are for standard specifications

† Military QPL Engines

GASOLINE

DIESEL

**Part:** Insert for car-door knob

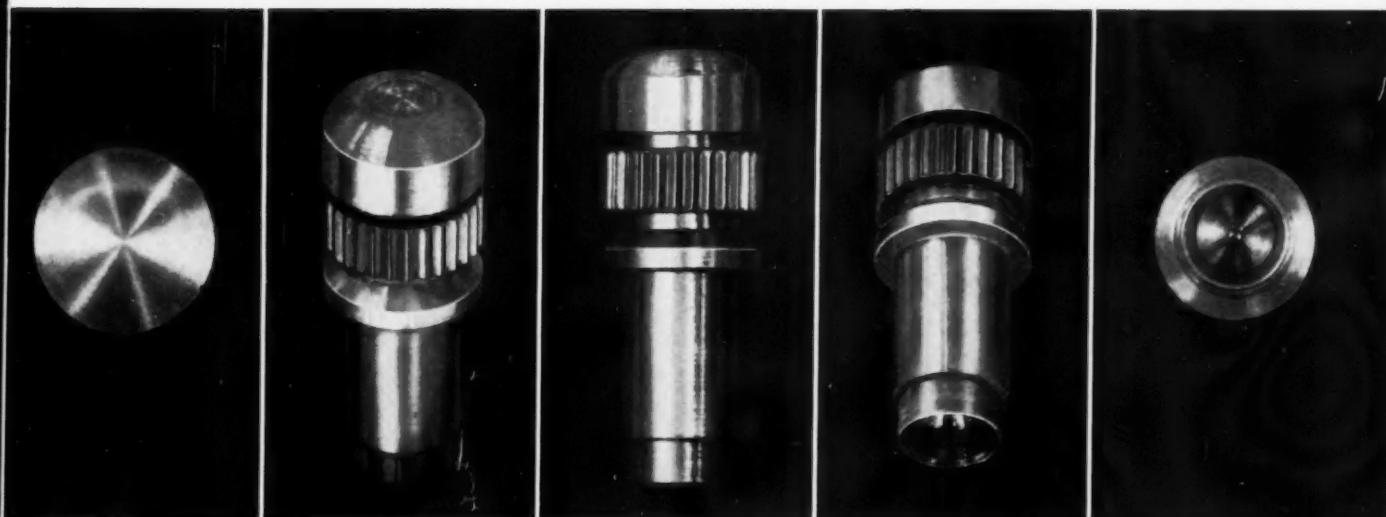
**Screw Stock:** 13/32 in. BETH-LED round, cold drawn

**Chip Removal:** 41 per cent

# Cutting Speed: 284 SFM—up 29 per cent\*

**Production Rate:** 1920 pieces/hour—increased by 33 per cent\*

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## CALENDAR

### OF COMING SHOWS AND MEETINGS

Packaging Machinery Institute Show of 1961, Detroit ..... Nov. 7-10  
 Society of Automotive Engineers, Fuels and Lubricants Meeting, Houston ..... Nov. 9-13  
 American Society for Testing Materials, International Conference on Electrical Contacts, Pennsylvania State University, University Park, Pa. ..... Nov. 14-16  
 Steel Founders' Society of America, Technical and Operating Conference, Cleveland ..... Nov. 13-15  
 National Industrial Conference Board, Detroit ..... Nov. 16  
 American Society of Mechanical Engineers, 1961 Annual Meeting, New York City ..... Nov. 26-Dec. 1  
 Malleable Founders Society, Semi-Annual Meeting, Cleveland ..... Dec. 1  
 Annual International Visual Communications Congress, Los Angeles ..... Dec. 2-5  
 Machine Knife Association, Annual Meeting, New York City ..... Dec. 4  
 The Society of the Plastics Industry, Inc., 9th Plastic Film, Sheet- and Coated Fabrics Conference, New York City ..... Dec. 7-8  
 Metal Cutting Knife Association, Annual Meeting, Pittsburgh ..... Dec. 19  
 Society of Automotive Engineers, 1962 Automotive Engineering Congress and Exposition, Detroit ..... Jan. 8-12  
 52nd National Motor Boat Show, New York ..... Jan. 13-21  
 National Plant Engineering and Maintenance Show, Philadelphia ..... Jan. 22-25  
 American Society of Mechanical Engineers, 2nd Symposium On Thermophysical Properties, Princeton, N. J. ..... Jan. 24-26  
 Automotive Accessories Manufacturers of America Exposition, Chicago ..... Jan. 29-Feb. 1  
 Society of Plastics Engineers, 18th Annual Technical Conference, Pittsburgh ..... Jan. 30-Feb. 2  
 The Society of The Plastics Industry, Inc., 17th Reinforced Plastics Division Conference, Chicago ..... Feb. 6-8  
 The Material Handling Institute, Inc., The Industrial Truck Association, Monorail Manufacturers Association, Early Spring Industry Meetings, Atlanta, Ga. ..... Feb. 6-8  
 Malleable Founders Society, 7th Annual Technical and Operating Conference, Cleveland ..... Feb. 28-Mar. 1  
 Motor and Equipment Manufacturers Association, and Automotive Service Equipment Association, 1962 International Automotive Service Industries Show, Chicago ..... Feb. 28-Mar. 3  
 Society of Automotive Engineers, Automobile Week, Combined National Automobile and Production Meetings, Detroit ..... Mar. 12-16  
 6th Annual Automobile Show, New York ..... Apr. 21-29

## VICTOR

### TYPE K4



### TYPE K6



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as narrow as  $\frac{1}{4}$ -inch

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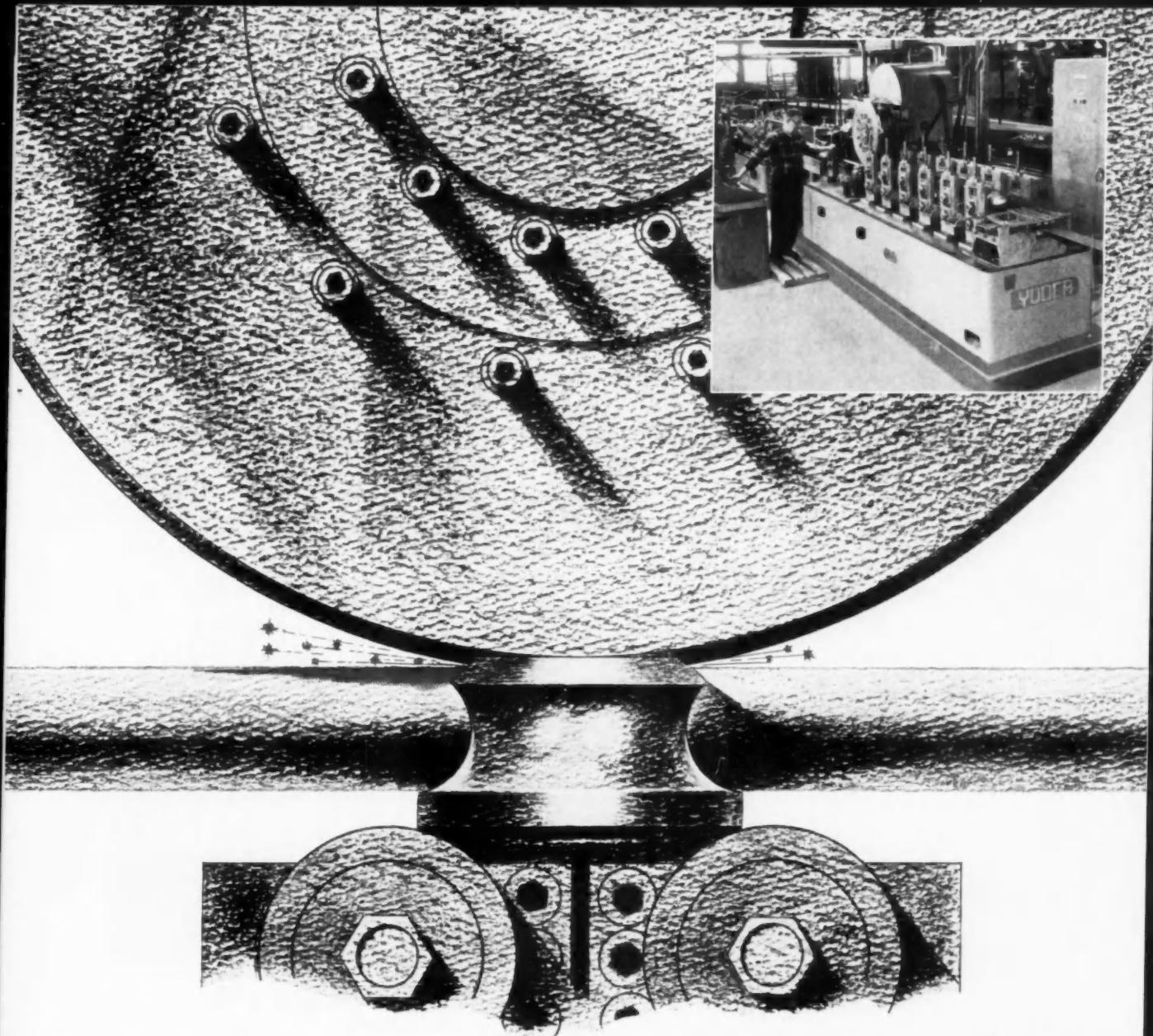
What does Plastene's rigid emphasis on precision mean? It means that Plastene draws on its outstanding engineering and fabrication skills to control every step of the manufacturing process. Which, in turn, means that every item from the beginning to the end of each production run is turned out to Plastene's uncompromising quality standards.

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Address \_\_\_\_\_

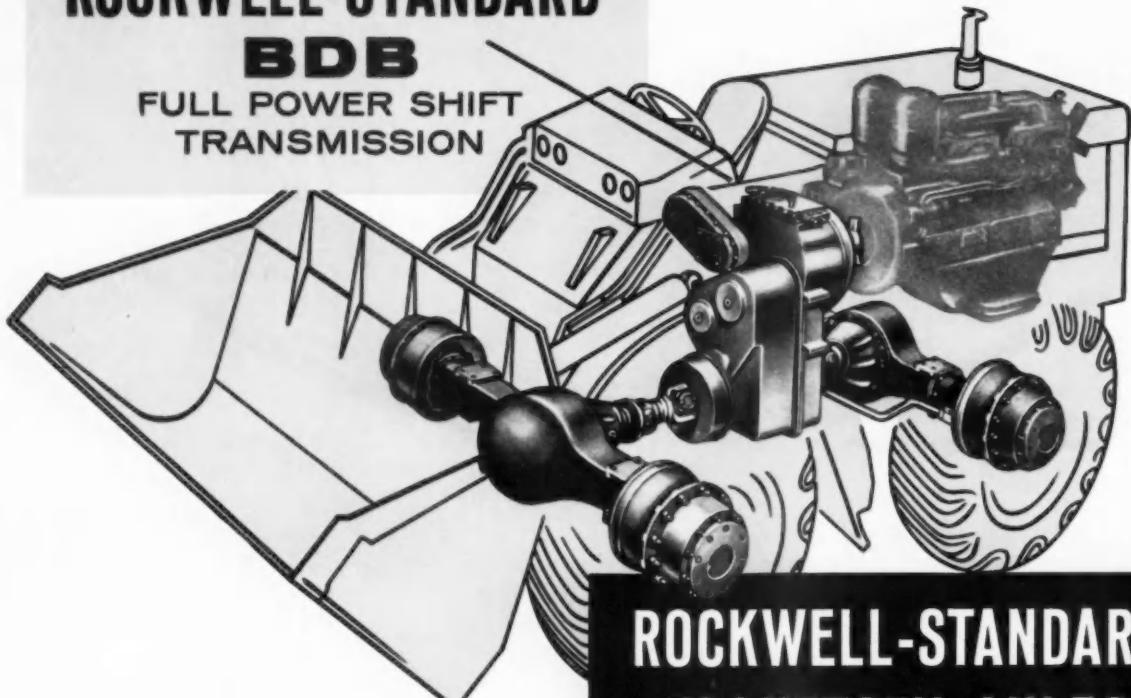
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**BDB**

FULL POWER SHIFT  
TRANSMISSION



**ROCKWELL-STANDARD  
PLANETARY AXLES**

Loaders and similar heavy-duty vehicles teamed with these components are "computer matched" for a winning performance. Optimum traction, acceleration and power utilization assure faster work cycles with larger *per hour* profits.



Rockwell-Standard type BDB Hydra-Drives transmission combines in one package the desirable features of a hydraulic torque converter and full power shift transmission with compact "built-in" drop box construction. Clean, rugged, four-speed countershaft design reduces maintenance costs. Built to last, it contains up to 35% fewer parts, is easier to understand and quicker to service.



Rockwell-Standard Planetary Axles assure dependable, rugged, efficiently designed units capable of maximum performance on any heavy duty operation. Exclusive features provide equal distribution of loading to all planetary gears—a minimum of maintenance—constant lubrication of all parts—and a full range of capacities in rigid and steering axles.

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CORPORATION

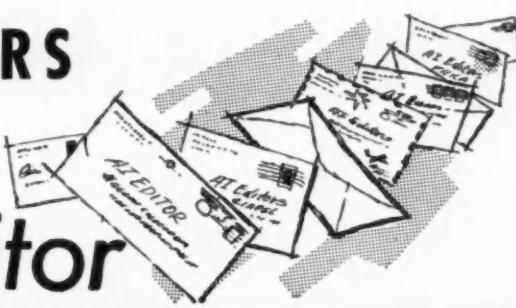


Transmission and Axle Division, Detroit 32, Michigan

# LETTERS

to the

## Editor



Readers' opinions or requests for additional information on material appearing in the editorial pages of AUTOMOTIVE INDUSTRIES are invited for this column. No unsigned letters will be considered, but names will be withheld on request. Address Letters to the Editor, AUTOMOTIVE INDUSTRIES, 56th & Chestnut Sts., Philadelphia 39, Pa.

### ROTARY CYLINDER ENGINE

If available, I would like to receive more detailed information on the British rotary cylinder engine described by David Seath in your August 1 issue. Perhaps you can give me the name of the person or parties with whom I could communicate directly on the subject.

C. H. Beiger  
Special Projects  
Merchandise Development and Test  
Sears, Roebuck and Co.  
Chicago, Ill.

### MAKING PRODUCTION PAY

We have received a September 1 issue of AUTOMOTIVE INDUSTRIES, and are delighted with the splendid presentation which your journal has made of our machines. Naturally, we have a biased point of view as we read this issue. However, you are to be congratulated on all the copy, for all of it is interesting, well presented, and certainly very timely.

We feel that we are operating in a frontier area. Our business is not routine, and presents many challenging problems. Your recognition of the newsworthiness of our work is appreciated, for it leads us to believe that we have perhaps made some significant contributions in the constant search for improved productivity.

C. C. Holloway  
President  
Gilman Engineering &  
Manufacturing Co.  
Janesville, Wisconsin

### AMPHIB

In the September 1 issue of your Magazine, there was an article on the Nobel-Amphibil, a Norwegian-designed amphibious car. Would

you be kind enough to please send me the address where I may write to get more information on the same.

F. N. Piasecki  
President  
Piasecki Aircraft Corp.  
Philadelphia, Pa.

• Nobel Industries Ltd., 1 Great Cumberland Place, Marble Arch, London West 1, England—Ed.

### FLUOROCARBONS

On page 76, Figure 4 of "Plastics in the Automotive Industries, Part III, Fluorocarbons," the article mentions Firestone's Exxon 461. It appears that this material may be suitable as a printed circuit board coating.

Please forward the name and address of Firestone personnel who could be contacted to supply additional information.

John F. Schroepfer  
Process Engineer  
Ryan Electronics  
San Diego, Calif.

• Try Mr. Russell A. Park,  
Chemical Sales Service, Firestone  
Plastics, Pottstown, Pa.—Ed.

### TWO-CYCLE ENGINE

I note your remark that a free copy of the cut of the two-cycle engine appearing on page 13 of your September 15 issue is available on request. Will you please send this information.

J. O. McLean  
Director, Automotive  
Department  
Reynolds Metals Company  
Richmond, Va.

• It's on the way. We are gratified at the number and quality of requests for the cut.—Ed.



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we're up to our ears  
in screws!**

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Screws**

Regardless of the size, head style, material or finish of the standard fasteners needed for profitable assembly in your plant, Southern carries them in stock. This means that your order, large or small, can be on its way to you within hours after it is received if you request rush service.

YOU are the reason we are up to our ears in fasteners! We're ready—today—to fill your order with USA-made Southern fasteners. Write direct to Southern Screw Company, P. O. Box 1360, Statesville, North Carolina for our current Stock List, or see your local Southern distributor.

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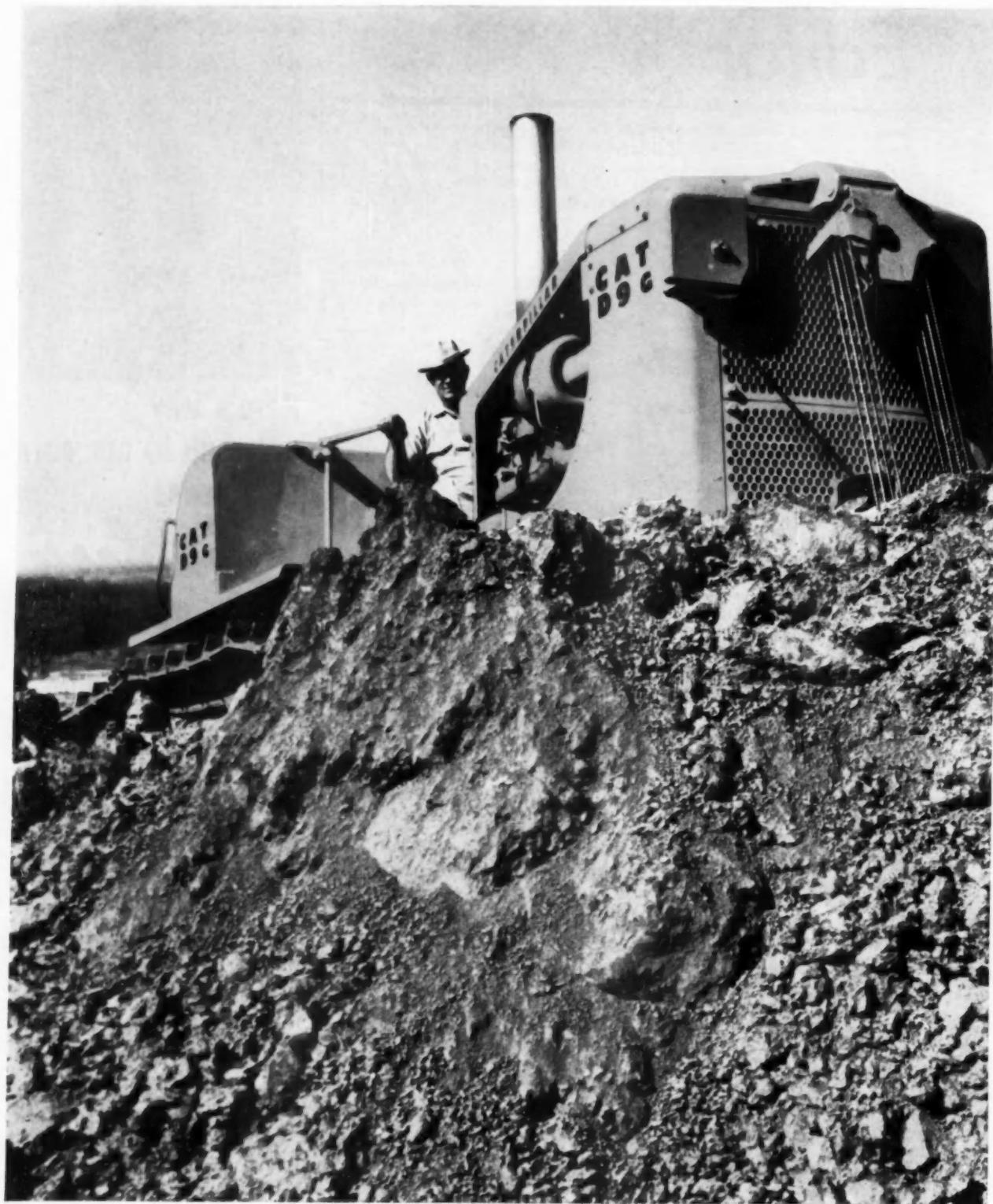
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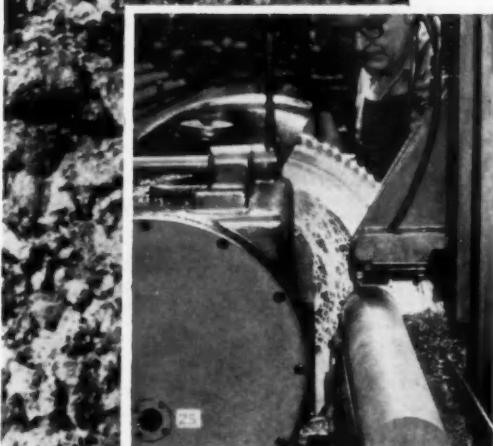
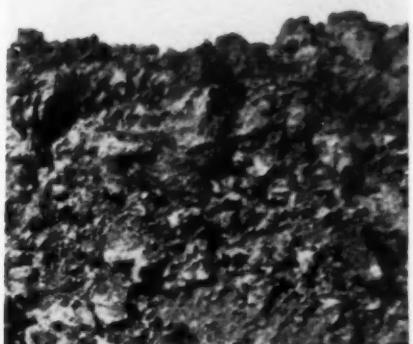


Circle 115 on Inquiry Card for more data

# What makes D9s so



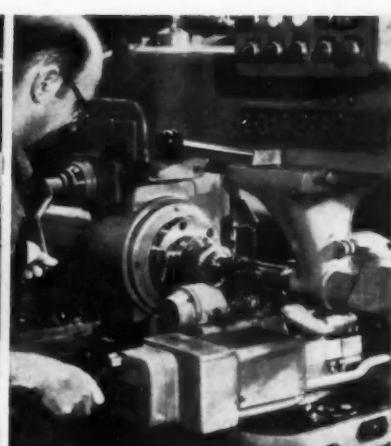
# strong? And last so long?



High-speed saw cuts USS Alloy Bars into proper lengths for finished parts.



Transmission shafts are rough ground to general tolerances before finish grinding.



Hob operation cuts teeth into shaft—precise tolerances are extremely important here.



This mark tells you a product is made of modern, dependable Steel.



All Cat-built tractors *must* be able to take it—they lead a hard life. Especially the big, new D9G whose ferocious snarl is the result of a whopping 385 flywheel horsepower. That's an increase of 100 hp since the first D9 was introduced 5 years ago. It means that from stack to track, steel components have to be far stronger, more rugged. Solution: Caterpillar uses USS Alloy Bars for critical power train parts such as the final drive pinion. Says Caterpillar, "USS Alloy Bars meet our rigid specifications for strength, hardenability, durability, and precise tolerances."

USS Alloy Bars are not only exceptionally strong and durable, but they have excellent fabricating characteristics as well. Distortion during heat treatment and machining is an absolute minimum. USS Alloy Bars retain dimensional accuracy during quenching. And USS Alloy Bars are available in the widest range of sizes, shapes and grades in the industry. Order what you need from your nearest U. S. Steel sales office or Steel Service Center. USS is a registered trademark of United States Steel.

United States Steel Corporation • Columbia-Geneva Steel Division • Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company

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**United States Steel**

# Now—A Spicer 12-Speed Transmission (SYNCHRONIZED OR UNSYNCHRONIZED) mission to Fit Your Requirements

As another step in Dana's continued program designed to keep pace with the varying requirements of the trucking industry, the availability of the 8125-U offers manufacturers of heavy-duty highway vehicles an option of synchronized or unsynchronized units in a multi-speed transmission. No other comparable transmission in the heavy-duty field offers this choice.

Because it provides sufficient low gear reduction (10.45 to 1), plus progressive, non-overlapping, close steps to handle varying road and load conditions, the use of supplemental gearing with the 8125-U is not required. The 12 evenly-spaced forward ratios promote efficient engine performance at all speeds. For example, the average R.P.M. spread between all gears, 1 through 12, is 455 R.P.M.

With the exception of the hand shift synchronizers, which are eliminated, Model 8125-U retains all the design and operating features of the Spicer fully-synchronized 12-speed box, Model 8125. Splitter and range shift synchronizers which are air operated have been retained.

An added feature to the Model 8125-U is the provision for a clutch brake. This brake facilitates shifting into first and reverse without severe gear clash by slowing down or stopping rotation of the transmission main drive gear and internal gears.

## GENERAL SPECIFICATIONS:

	8125 ALUMINUM	8125-U ALUMINUM
WEIGHT (LESS CLUTCH)	600 LBS.	600 LBS.
CLUTCH HOUSING—S.A.E. No.	1—2	1—2
OIL CAPACITY (S.A.E. 50)	28 PTS.	28 PTS.
P.T.O. STANDARD OPENINGS	R/L 6-BOLT	R/L 6-BOLT
SHIFT CONTROL	O.H./REM	O.H./REM
OVERALL LENGTH	31.00"	31.375"
SPICER CLUTCH 15.5" 2-PLT.	140 LBS.	140 LBS.
14" 2-PLT.	96 LBS.	96 LBS.

## AVAILABLE RATIOS Model 8125 & 8125-U

### FORWARD

1st — 10.45 to 1	7th — 2.55 to 1	1st — 10.45 to 1
2nd — 8.38 to 1	8th — 2.05 to 1	2nd — 8.38 to 1
3rd — 6.52 to 1	9th — 1.59 to 1	3rd — 6.52 to 1
4th — 5.23 to 1	10th — 1.28 to 1	4th — 5.23 to 1
5th — 4.09 to 1	11th — 1.00 to 1	5th — 4.09 to 1
6th — 3.28 to 1	12th — .80 to 1	6th — 3.28 to 1

### REVERSE



As with the synchronized version, the 600-pound Model 8125-U, with standard all-aluminum case, is lighter and approximately 12 inches shorter than any multiple-speed transmission of comparable capacity on the market.

## SPECIFY SPICER!



**DANA**  
CORPORATION

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SERVING TRANSPORTATION—Transmissions • Auxiliaries • Universal Joints • Clutches • Propeller Shafts • Retarders • Power Take-Offs • Torque Converters • Axles • Powr-Lok Differentials • Gear Boxes • Forgings • Stamping • Frames • Railway Drives

Spicer products available in Canada through Hayes Steel Products, Ltd., Merriton, Ontario



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**NEW UNIBRITE STAINLESS STEEL STRIP**

The only mill buffed strip!

Developed and perfected by  
Universal-Cyclops.

Both sides mirror bright,  
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Unmatched uniformity from coil to coil.

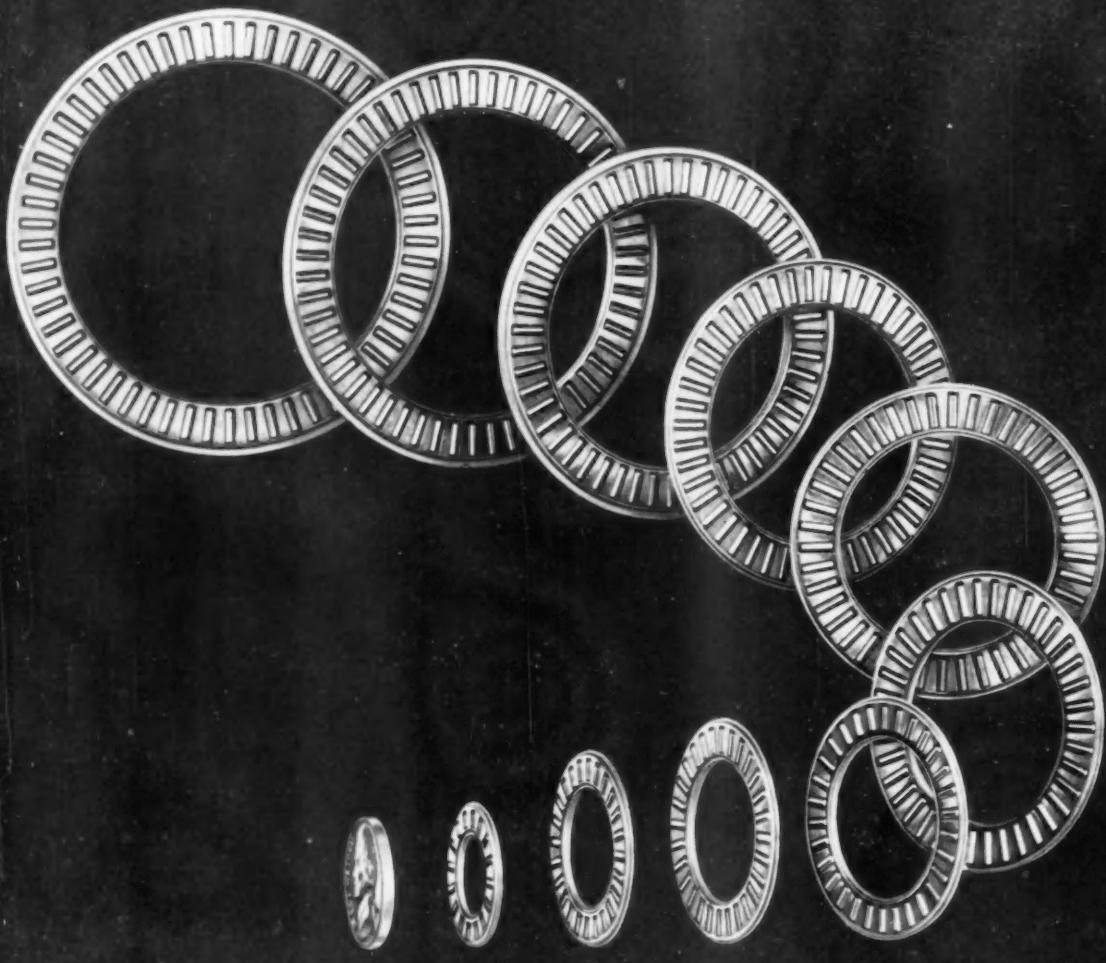


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STAINLESS STEELS • TOOL STEELS • HIGH  
TEMPERATURE AND REFRACATORY METALS

# TORRINGTON



## SEE WHAT YOU GET IN A BEARING NO THICKER THAN A NICKEL

Torrington Needle Thrust Bearings offer true anti-friction operation, high thrust capacity, wide size range, low unit cost...all in a unit no thicker than a nickel or ordinary thrust washer.

That's not all! These exceptional bearings have an O.D. much smaller for a given shaft size than any other type of thrust bearing. You can run them on hardened and ground surfaces, or on standard races. They're completely self-contained . . . can be easily handled and installed.

Remember Torrington Needle Thrust Bearings next time you need better performance in a restricted space. Call or write us for more information.



### RACES IF YOU WANT THEM

Standard races are available. Otherwise Torrington Needle Thrust Bearings may be run directly on hardened and ground adjacent surfaces.

*progress through precision*

**TORRINGTON BEARINGS**

**THE TORRINGTON COMPANY**

Torrington, Connecticut • South Bend 21, Indiana

# NEWS

Vol. 125, No. 9

November 1, 1961

## '62 Models Set Mark Detroit Tries to Satisfy All Needs

By James Dunne, Detroit Regional Editor,  
and C. B. Campbell, News Editor

When a leading automobile executive stated that Americans have rejected the "mail order suit" and are now insisting on custom tailored cars, he had a mountain of evidence to back up his statement.

Byron J. Nichols, Dodge general manager, referred to the record number of 1962 models this way: "We believe that two car families will soon be the norm and that families with three or more cars will be a common social phenomenon. Today, American families are aspiring to own a stable of automobiles made up of cars that meet the needs of each individual member of the family."

### 'Experts' Confused

And "meeting the needs" has been done this year on a far greater scale than ever before by the auto makers. Even the so-called experts who write about Detroit seem confused about the total number of 1962 models.

Depending on what basis is used for describing an individual car the "experts" say that from 320 to 400 basic models are on the domestic car market. Using any measuring

basis, this is an all-time record.

A great number of new models fall into the growing category of "personalized" cars. Notable followers of the personal car design pioneered by Thunderbird are the

Monza, Futura, S-22, Cutlass, Skylark, Lancer GT, Signet, Daytona, and LeMans in the compact size.

Full size cars similar in concept are Grand Prix, Starfire, Polara 500, Impala Super Sport and the Chrysler 300H.

### Bucket Seat Models

The personal car might be described as one not designed in the old tradition of all-purpose transportation. These cars typically provide luxury motoring with some shortcomings in economy and/or passenger capacity. Bucket seats

### ELECTRIC CAR HAS PLASTIC BODY



Pre-production prototype of Stuart, which will be made in Kalamazoo, Mich., by Stuart Motors, Inc. Body and frame work will be done in Cadillac, Mich., where plastics workers are available. Metal working will be done in Kalamazoo. The Stuart, 115 in. long and 64 in. wide can be converted from a four-passenger car to a light delivery truck with only a minor change in seating.

and higher horsepower engines are trademarks in this field.

The trend to personal cars has produced another trend, this one contradictory to the once booming demand for automatic transmissions. Personal cars are featuring four-speed manual transmissions in increasing numbers.

The growth of personal cars is the basis for Mr. Nichols' prediction of two-car families becoming the norm. Buyers are demanding a general purpose workhorse for family needs as in the past but want something more responsive in performance and attractive in styling for both business and social reasons.

### VW Legal Row Ends

West Germany's longest legal battle—the fight of 127,610 investors to get compensation from the Volkswagen Co.—has ended in a compromise.

The investors put up the price of a new Volkswagen in the 1930's to finance Hitler's promise of a "car for every worker."

The money went for armaments

instead of cars, and the investors have been trying to get their money back since the end of World War II.

The Federal Supreme Court said representatives of the company and the investors had agreed on a \$150 discount on a new car or a \$25 cash settlement.

### Ferrari Halts Racing

The Ferrari Auto Co. has announced it was "suspending" all racing activities as a result of the outcry which followed the disaster in Monza, Italy.

The Sept. 10 accident, Italy's worst in 33 years, came when the Ferrari of Wolfgang von Trips crashed into the crowd during the 32nd Grand Prix of Italy, killing the driver and 14 spectators.

### Vertol Order

The Bureau of Weapons has issued a contract to the Vertol Div. of the Boeing Co. for HRB-1 helicopters amounting to \$8.6 million. The helicopters will be used by the Marine Corps.

### Gordon Optimistic

Speaking before a group of the nation's leading railroad executives, General Motors President John F. Gordon described a startling picture of the future of America's transportation industry.

"We firmly believe that the expansion of our economy and the increase in our productivity are going to be so rapid that they will strain the resources of the entire transportation industry," Gordon said. "Even when we let our imaginations run wild, many of us find that the realities of the future often put our most fantastic dreams to shame."

"Barring a major war, it seems to me that we are about to enter a period of industrial and general economic development, both here at home and throughout the world that will dwarf any comparable period in history."

### NEW BRITISH SPORTS CAR



The Reliant Sabre has streamlined plastic body and Ford Consul engine. The electric cooling fan is thermostatically controlled to save power when the fan is not required. For improved road holding, the rear axle is located by trailing tubular arms with coil springs. Front suspension is by leading links.

### Army Orders M-114s

The Army has placed first production orders for a new type armored reconnaissance vehicle.

Two contracts totaling nearly \$15 million were awarded the Cadillac Motor Div. of General Motors Corp.

A \$9.1 million contract is for manufacture of 1215 M-114s. The second contract, for \$5.8 million, is for production facilities for the M-114.

The M-114 is a light vehicle with tractor-like treads. It can be air dropped and can operate on both land and water.

# NEWS

CONTINUED

## Simca 1000, Unveiled at 48th Paris Show, Has 45 HP Rear Engine Inclined 15 Degrees

The 48th Paris Automobile Show that opened last month did not reveal any great surprises but it was notable for being the first time the almost complete range of the world's 1962 production was assembled under one roof.

This year the honors probably go to the French for the new models they have produced. The latest, unwrapped only the day before the show, was dubbed the Simca 1000, a smaller version of the older Simca that is said to reach a speed of 72 mph in 20 seconds.

### Inclined Rear Engine

The makers put the engine in the rear and inclined it 15 deg. to the left. It develops 45 hp at 5000 rpm.

The company plans a daily production of 300. The car, whose body lines are reminiscent of the small Fiats, has a four-speed synchronized gearbox and has the five-bearing crankshaft mounting of the "Rush" engine.

The British firm of Rootes met the challenge of the year with a super version of the famous Minx light car that Sir William Rootes first introduced at the Paris Motor Show 30 years ago. It is a wider, more luxurious job than the previous Minx, has a 1600 cc engine, complete undercoating and meets the need for safety belts with three welded attachment points for different kinds of safety belts.

British Ford came out with a new version of the Anglia station wagon. They also introduced a

Capri coupe version of the English Consul, the German-made Taunus and the range of American-made big and compact Fords.

British cars in the main were slightly restyled, or in the case of the British Motor Corp.'s successful "mini" cars, one was adapted by the British racing firm of Cooper to give a speed of nearly 100 mph.

Panhard did not produce a new model but introduced a number of innovations like improved steering, new exhaust pipes and new front frame to lower the center of gravity of the P17 model, and improvements to the ventilation.

An innovation was the new Facel Vega, a hand-made French product

built around a Chrysler engine.

In the lower-priced lines the new British sports car Triumph TR4, a newly-styled version of the TR3 brought the makers scores of orders on the first day. There also was much interest in the new Dutch DAF with an improved automatic transmission, the Italian Fiats and the tiny NSU Prinz roadsters and the Neckar convertible.

### New Peugeot Convertible

Peugeot, one of the oldest and most successful French makers, limited its innovation to a new 404 convertible with a Pininfarina styled body. Mechanically, however, it has something really new—direct fuel injection.

General Motors also showed a new German-made Opel coupe and a new Taunus-like version of the British Vauxhall Victor.



New Hillman Super Minx

# Forecast of 1961 Motor Vehicle Registrations

By Marcus Ainsworth  
STATISTICAL EDITOR

MOTOR vehicle registrations for the fifty states and the District of Columbia are

expected to be in the neighborhood of 75,062,500 by the end of 1961. Add to these nearly one million ex-

empt or publicly-owned vehicles and by the end of the year slightly over 76 million vehicles will have been accounted for.

Passenger car registrations are expected to be around 63.31 million, a gain of 2.9 per cent over the 61,502,322 registered during 1960. Truck and bus registrations combined should total approximately 11.75 million, an increase of 2.6 per cent over 1960 when 11,455,704 were registered.

(Turn to page 86, please)

## Forecast of 1961 Motor Vehicle Registrations

As of the End of the Registration Year

These data do not include publicly-owned vehicles, with the exception of school buses. Total publicly-owned or exempt vehicles during 1960 were approximately 971,000

State	Passenger Cars		Per Cent Change	Trucks and Buses		Per Cent Change	Total Motor Vehicles		Per Cent Change
	1961	1960		1961	1960		1961	1960	
Alabama	1,044,000	994,022	+ 5.0	224,500	218,914	+ 2.6	1,268,500	1,212,936	+ 4.6
Alaska	70,000	68,787	+ 1.8	12,300	11,905	+ 3.3	82,300	80,692	+ 2.0
Arizona	519,200	485,412	+ 7.0	135,300	127,532	+ 6.1	654,500	612,944	+ 6.8
Arkansas	510,000	496,736	+ 2.3	202,000	203,076	- 0.5	752,600	701,812	+ 7.2
California	6,850,000	6,527,030	+ 4.9	1,010,000	956,538	+ 5.6	7,860,000	7,483,568	+ 5.0
Colorado	745,000	707,606	+ 5.3	205,000	192,902	+ 6.3	950,000	900,508	+ 5.5
Connecticut	1,005,800	984,996	+ 2.1	118,900	115,699	+ 2.8	1,124,700	1,100,695	+ 2.2
Delaware	146,000	142,297	+ 2.6	52,000	47,851	+ 8.7	198,000	190,148	+ 4.1
District of Columbia	185,300	180,846	+ 2.4	20,700	19,671	+ 5.2	208,000	200,617	+ 2.7
Florida	2,115,200	2,045,582	+ 3.4	301,400	305,100	- 1.2	2,416,600	2,350,682	+ 2.8
Georgia	1,252,600	1,215,079	+ 3.1	279,500	279,783	- 0.1	1,532,100	1,494,862	+ 2.5
Hawaii	214,200	197,755	+ 8.3	29,600	29,320	+ 0.9	243,800	227,075	+ 7.4
Idaho	255,000	253,951	+ 0.4	100,000	101,852	- 1.8	355,000	355,803	- 0.2
Illinois	3,366,200	3,302,125	+ 1.9	456,600	445,550	+ 2.5	3,822,800	3,747,675	+ 2.0
Indiana	1,715,000	1,678,211	+ 2.2	350,000	351,541	- 0.4	2,065,000	2,029,752	+ 1.7
Iowa	1,070,000	1,068,261	+ 0.2	244,000	238,309	+ 2.4	1,314,000	1,306,570	+ 0.6
Kansas	895,000	869,952	+ 2.9	284,000	272,862	+ 4.1	1,179,000	1,142,814	+ 3.2
Kentucky	970,000	948,024	+ 2.3	248,000	233,451	+ 6.2	1,218,000	1,181,475	+ 3.1
Louisiana	960,000	936,900	+ 2.5	228,500	224,361	+ 1.8	1,188,500	1,161,261	+ 2.3
Maine	310,700	302,097	+ 2.8	80,700	80,346	+ 0.4	391,400	382,443	+ 2.3
Maryland	1,030,100	1,001,949	+ 2.6	143,800	144,839	- 0.7	1,173,900	1,146,788	+ 2.4
Massachusetts	1,658,000	1,606,591	+ 3.2	189,100	188,104	+ 0.5	1,847,100	1,794,695	+ 2.9
Michigan	2,939,100	2,875,758	+ 2.2	405,400	391,003	+ 3.7	3,344,500	3,266,761	+ 2.4
Minnesota	1,325,000	1,272,037	+ 4.2	278,000	265,555	+ 4.7	1,603,000	1,537,592	+ 4.3
Mississippi	548,000	527,190	+ 3.9	192,000	182,575	+ 5.2	740,000	709,765	+ 4.2
Missouri	1,420,000	1,414,750	+ 0.4	350,300	348,172	+ 0.6	1,770,300	1,762,922	+ 0.4
Montana	266,000	260,313	+ 2.2	115,500	116,482	- 0.8	381,500	376,795	+ 1.2
Nebraska	577,400	562,946	+ 4.4	177,300	168,500	+ 4.6	754,700	722,446	+ 4.5
Nevada	155,000	148,744	+ 4.2	40,700	38,311	+ 6.2	195,700	187,055	+ 4.6
New Hampshire	215,000	207,552	+ 3.6	23,000	22,177	+ 3.7	238,000	229,729	+ 3.6
New Jersey	2,199,000	2,096,088	+ 4.9	267,000	274,867	- 2.9	2,466,000	2,370,955	+ 4.0
New Mexico	342,000	334,634	+ 2.2	125,600	120,128	+ 4.0	467,000	454,762	+ 2.7
New York	4,572,000	4,490,882	+ 1.8	536,000	521,596	+ 2.8	5,108,000	5,012,448	+ 1.9
North Carolina	1,425,000	1,374,317	+ 3.7	318,000	307,326	+ 3.5	1,743,000	1,681,643	+ 3.6
North Dakota	235,000	231,034	+ 1.7	114,000	106,072	+ 4.5	349,000	340,106	+ 2.6
Ohio	3,700,000	3,618,248	+ 2.2	428,000	424,677	+ 0.8	4,128,000	4,042,925	+ 2.1
Oklahoma	901,400	877,353	+ 2.7	305,700	287,347	+ 6.4	1,207,100	1,164,700	+ 3.6
Oregon	858,900	833,526	+ 3.0	68,500	69,433	- 1.3	927,400	902,961	+ 2.7
Pennsylvania	3,903,000	3,839,822	+ 1.6	610,500	598,809	+ 1.8	4,513,500	4,439,631	+ 1.7
Rhode Island	307,000	301,660	+ 1.8	37,400	38,106	- 1.9	344,400	339,756	+ 1.4
South Carolina	685,700	703,215	- 2.5	143,000	139,786	+ 2.3	828,700	843,101	- 1.7
South Dakota	258,800	254,724	+ 2.0	97,100	93,162	+ 4.2	356,900	347,886	+ 2.6
Tennessee	1,135,000	1,110,219	+ 2.2	243,000	237,302	+ 2.4	1,378,000	1,347,521	+ 2.3
Texas	3,633,500	3,512,421	+ 3.4	915,500	875,789	+ 4.5	4,549,000	4,388,210	+ 3.7
Utah	342,000	326,194	+ 4.2	85,000	81,360	+ 4.4	427,000	409,554	+ 4.2
Vermont	138,600	136,279	+ 1.7	13,600	13,919	- 2.3	152,200	150,198	+ 1.3
Virginia	1,242,100	1,176,725	+ 5.5	238,500	228,761	+ 4.2	1,480,600	1,405,486	+ 5.3
Washington	1,137,400	1,085,722	+ 4.7	260,800	260,036	+ 0.3	1,398,200	1,345,758	+ 3.9
West Virginia	480,000	470,747	+ 2.0	128,000	126,878	+ 0.9	608,000	597,625	+ 1.7
Wisconsin	1,338,900	1,328,947	+ 0.7	255,700	260,853	- 2.0	1,594,600	1,589,800	+ 0.3
Wyoming	141,000	139,904	+ 0.8	64,000	62,216	+ 2.9	205,000	202,120	+ 1.4
Total—United States	63,310,100	61,520,322	+ 2.9	11,752,400	11,455,704	+ 2.6	75,062,500	72,976,026	+ 2.9

# HYCAR 4021

operates from 100° to 150° higher  
than  
most other rubbers

RESISTS SULFUR-BEARING OILS, TOO. This polyacrylic rubber provides unusually high oil resistance, remaining soft and flexible even in service with sulfur-bearing, extreme-pressure lubricants. Hycar 4021 operates at 350° to 400°F., far higher than most other rubbers can stand.

Its excellent physical properties and good high-temperature compression set make it ideal for hydraulic transmission seals, hose, automotive gaskets, and "O" rings. In addition, Hycar 4021 is often the logical choice for belting, tank linings, white or pastel colored goods and solvent coatings for industrial fabrics where high-temperature service is encountered.

You can get complete information on the advantages and compounding of Hycar 4021 in Bulletin HM-3. For a copy, or for information about any of the many Hycar rubbers and latices, write Department MK-6, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

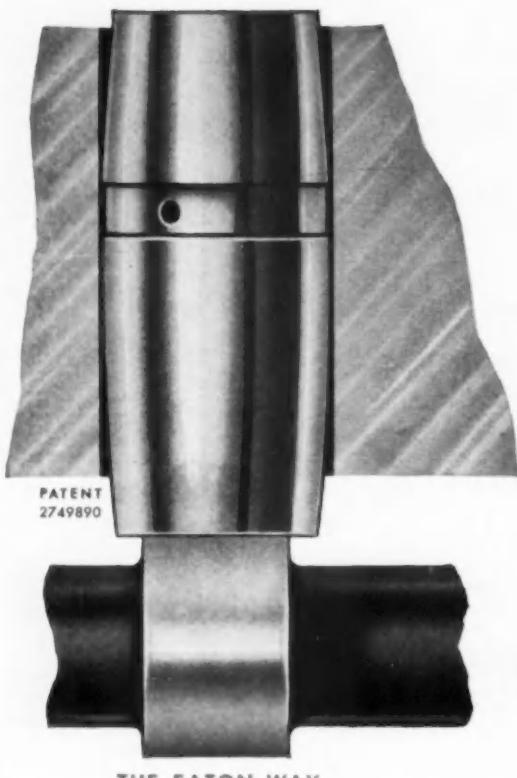
*See our catalog in Sweet's Product Design File.*

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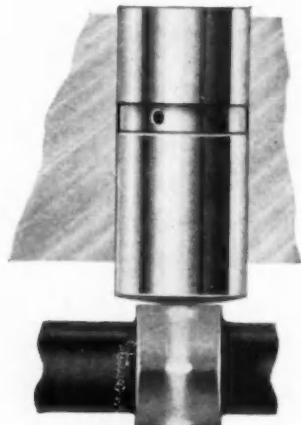


THE EATON WAY

# REDUCE UNIT STRESS

with

## Eaton Flat-Face Self-Aligning Tappets and Hydraulic Valve Lifters



THE OLD WAY

Spherical-face tappets make only limited area contact with the cam. Result: high unit stress, damaging wear, and pitting.

★ ★ ★

Conventional flat-face tappets lower unit stress, but their use has been limited by misalignment and deflection, resulting in edge-riding.

★ ★ ★

Eaton Self-Aligning Flat-Face Tappets permit **FULL CONTACT** between cam and tappet under all operating conditions.

★ ★ ★

Lower unit stress adds to tappet and hydraulic valve lifter life, and reduces engine maintenance cost.

*If you are interested in longer tappet and valve lifter life, call us for a consultation.*

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SAGINAW DIVISION  
MANUFACTURING COMPANY  
9771 FRENCH ROAD • DETROIT 13, MICHIGAN



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Truck and Trailer Axles • Truck Transmissions • Permanent Mold Iron Castings • Automotive Heaters and Air Conditioners  
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Powdered Metal Parts • Gears • Variable Speed Drives • Speed Reducers • Differentials • Centralized Lubrication Systems

# SILICOLOGY

## Studies in Silicones

HOW THESE TIME-TESTED MATERIALS  
CAN WORK FOR YOU

### Silicone Rubber Takes to the Air ...And a Customer Tells Us Why

A recent letter from a UNION CARBIDE Silicone Rubber customer is one of those that makes us like to read our mail. We quote parts of it below in the hope that it will serve as a "refresher" on the properties that have made silicone rubber virtually indispensable in modern aircraft.

The letter is from the Engineering Laboratories of the Electric Autolite Company, Wire and Cable Division, Port Huron, Mich., which states:

#### RESISTS OZONE, CORONA, COLD, AND MOISTURE

"Silicone rubber, because of its excellent heat resistance and dielectric strength, has been specified as insulation on aircraft lead wire for a number of years. More recently, these same properties have promoted its use on ignition cables for automobiles, aircraft, and military vehicles. Spark plug boots, attached to the cables, are also molded of silicone rubber because of the continuous high temperatures to which they are subjected.

"In addition to dielectric and heat-resisting properties, there are other advantages in the use of silicone extruded insulation. It is readily compounded for extrusion, extrudes smoothly, and strips easily from the conductor; the finished wire has excellent shelf life as well as good service life, it can be used at high altitude, remains flexible at low temperatures, and resists ozone, corona, and moisture."



**SILICONE** rubber-insulated wire and cable, capable of withstanding continuous high temperatures, is used in powerful aircraft engines.

#### MORE RELIABLE FOR CARS, TOO

The letter gives a forward-looking hint to Detroit as it goes on to state: "Newer automobile engine designs, for greater efficiency by operation at higher temperatures, should further increase the requirements for this more reliable ignition cable.

"UNION CARBIDE Silicone Rubbers are among those used for The Electric Autolite Company's insulated wires and cables, and their KW-1330 silicone rubber base has been approved for use on ignition cables."



**U. S. NAVY'S WV-2** far-flying sentinel, which can stay airborne for extended periods of time, carries America's most powerful search radar as part of the nation's defense against sneak attacks.

Bendix Corporation, Scintilla Division, is one of Autolite's customers. Bendix in turn supplied the silicone-insulated spark plug leads for engines that power such giants of the skies as the Lockheed Super Constellation-type radar airplanes, designated by the United States Navy as WV-2. Able to range far out to sea and carry out special early warning missions, this long-distance plane carries America's most powerful search radar to high altitudes to avoid normal limitations from radar's inability to bend over the horizon.

#### WHERE CAN SILICONES BENEFIT YOU?

You'll also find silicone-insulated ignition cables boosting the reliability of military vehicles, tanks, and trucks. And if you're a track fan, they're virtually a "must" to stock car racers.

Aircraft technology and development are changing more rapidly than ever before. Perhaps you are overlooking a good bet—some place in the design of your products where a UNION CARBIDE Silicone Rubber can serve you, improving quality at a surprisingly low cost. Send the coupon for further information.



## SILICONES

UNION CARBIDE is a registered trade mark of Union Carbide Corporation.

Silicones Division  
Union Carbide Corporation  
Dept. KB-9105, 30-20 Thomson Avenue,  
Long Island City 1, N. Y.  
In Canada: Union Carbide Canada, Ltd.,  
Bakelite Division, Toronto 12.

Please send me data on \_\_\_\_\_

NAME \_\_\_\_\_

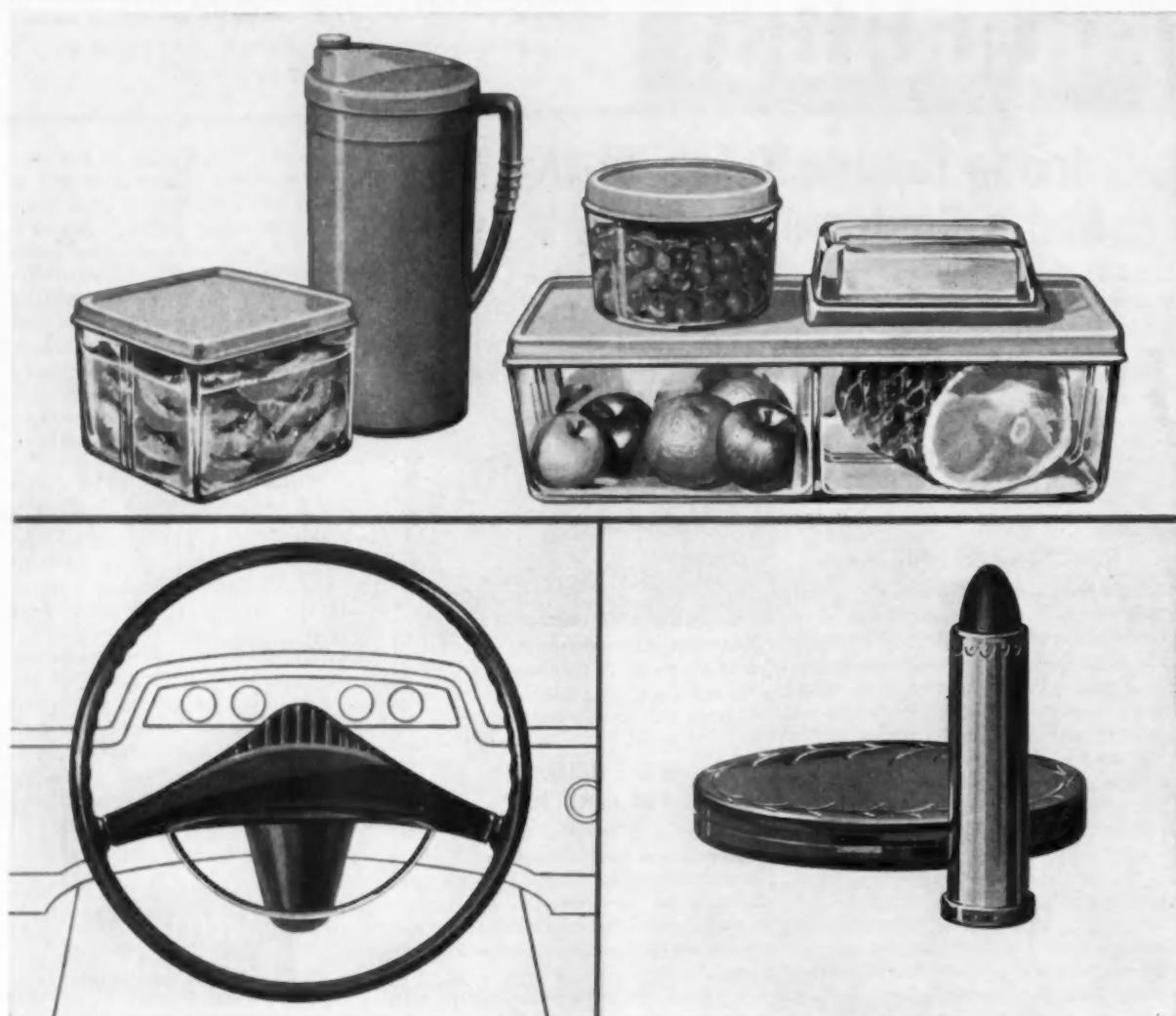
TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

## What's News in Plastics...



## Specify **Escon**<sup>®</sup> polypropylene for low odor pick-up

Escon has no taste or odor of its own and is highly resistant to stain and odor pick-up. This important property makes Escon an excellent choice for food storage containers and packaging, compacts and lipstick cases—even automobile steering wheels.

Escon polypropylene offers manufacturers a bal-

anced combination of properties for high-speed, profitable production—including resistance to dynamic fatigue, high strength, chemical and abrasion resistance, and many more. Expert technical assistance is always available. For full details, write to Enjay, 15 West 51st Street, New York 19, N. Y.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

**ENJAY CHEMICAL COMPANY**

A DIVISION OF HUMBLE OIL & REFINING COMPANY



# NEWS

## FEATURES

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### Engine Advances Seen

#### Many Changes Predicted by Raviolo

New engines that hit the market in the last two years are only a small indication of great strides in power plant design that will be made in the decade ahead. Not only will conventional engines increase in performance and economy, but exotic engines will show up in working prototypes in increasing numbers.

Here are some trends predicted by Victor G. Raviolo, executive director of Ford Motor Co.'s engineering staff:

High speed, light weight Diesels will make a major breakthrough in taxicab, delivery truck and farm truck fields.

Gas turbines will be confined to heavy duty trucks and buses for some time.

#### Fuel Formula Sought

In research, engineers are looking for a fuel formula that gives quick release of electrical energy and can be stored, manufactured, transported and distributed at low cost.

In the gasoline engine field, the 60s have already produced a number of new designs, the 6-cylinder undergoing most change. The flat six, inclined six, aluminum die cast six and finally the 90-degree V-6 are the most recent innovations in the old standard engine. Observers are foreseeing more

new 6-cylinder changes with more than one aluminum V-6 die cast job predicted for the future.

The 60s also have reintroduced the 4-cylinder design for American cars. First came Tempest's one-half V-8. Then, this year Chevy II brought out its conventional 4-cylinder model. Newsman expect a brand new V-4 from Ford for its sub-compact.

Mr. Raviolo's expectations for a larger Diesel market already are being realized. Chevrolet's two new Diesels are evidence of that.

And another maker has been installing Perkins Diesels in taxicabs for some time now. Mack and Ford are readying all-new Diesels of their own in addition to their current Diesel offerings.

Mr. Raviolo sees a possibility of Diesel engines being offered as optional power plants for private passenger cars. These, of course, would be much different in design from the truck engines mentioned above.

Gas turbines have been relegated to a fairly limited field in the near future by Mr. Raviolo because of their higher initial cost. Research in this type of design is continuing with Ford's latest turbine utilizing a supercharger.

#### MERCEDES 220SE CONVERTIBLE



Introduced at the Frankfurt Motor Show, its soft top retracts completely into the body. It is powered by a six-cylinder 134-hp. fuel injection engine driving through a synchromesh four-speed transmission.



Lightweight chambers for rocket motors made of glass fiber reinforced with plastic are expected to assist the space and missile program.

\* \* \*

A new process employs controlled crystallization to separate aluminum from iron from a solution of salts of the two made from aluminous (20 per cent) clay as an intermediate step in deriving the light metal from this abundant source.

\* \* \*

Boron silicides that are usable as refractories up to 2500 F are now on the market, made by a new solid state process.

\* \* \*

The Business and Defense Services Administration, U. S. Dept. of Commerce has published the results of one of the most comprehensive surveys ever made of the abrasive products industry in the country. While output is about \$400 million annually, the level is declining, the survey reveals. Technical improvements that give more lasting qualities to some products and changes in metalworking fabricating processes are among the factors responsible for the reduced demand.

\* \* \*

An indication of the growing industrialization of the South is the growth of the tire industry there. From one plant employing 700 persons and producing 5000 tires daily in 1935, the Southern tire industry has expanded to nine plants in 1960 with a daily capacity of 132,500 tires.

\* \* \*

Static properties—as they are determined for the initial condition of a metal or subsequent to some metallurgical change—are not a reliable index for the characterization of creep behavior, according to an Air Force study of environmental creep behavior in aluminum alloy sheet.

A newly developed thermo-electric device can either freeze or boil drops of water in seconds and produce temperatures as low as -100 F. It employs bismuth telluride parts.

\* \* \*

A new, economical method of producing copper sheet from ore without intermediate smelting will be used in a new plant being built in the Philippines to handle a copper-zinc ore mined there.

\* \* \*

All segments of the copper industry showed improvement during May, and the total available new supply of refined copper rose to 169,000 short tons, an eight-month high.

\* \* \*

A guide to the safe storage, handling, shipping and processing of zirconium and its alloys has been released to industry and the public.

\* \* \*

Evidence that ballistic performance of welded armor plating can be correlated to, and to some extent, predicted by results of V notch Charpy impact tests is presented in a research report prepared for the Army Ordnance Corps. Two research reports are available on the impact of steel and aluminum pellets on steel and aluminum armor plate, and a comparison of shear strength values of aluminum obtained by three methods.

\* \* \*

In 1960, a total of 7151 thousand internal combustion engines (except outboard, automotive, and aircraft) were shipped to other companies or produced and incorporated into products of the same company. A total of 17003 thousand gasoline engines were produced, a decrease of two per cent from 1959. Diesel and semi-Diesel engine output was 139 thousand, a decrease of 23 per cent.

## New Tool Treatment

Several large automakers reportedly are investigating the performance of Dalton Atom Process treated tooling, a method developed by Atom Steel Inc., Olmstead Falls, O. The process subjects heat treated alloy steels, such as cutting tools, to the action of controlled sonic waves of appropriate frequency and power to relieve embrittling stresses. Its application permits the use of alloy steels heat treated to maximum hardness without the usual risk of residual stresses. It corresponds to a tempering operation without application of heat or loss of hardness.

When applied to tools of any kind the stress level is greatly reduced and the applied stresses do not approach the level required to cause breakdown of the cutting edge. This behavior is true only of tools hardened at or above 62-64 Rc. Still better results are obtained when hardness is of the range of 65-67-Rc. An interesting by-product of the process is said to be that it becomes easier to grind the tools and obtain better finishes after using the process.

The organizations testing the process recently investigated over 100 different operations, tested repetitively. Excellent results in tool life and wear part life are said to have been reported, often in excess of 100 per cent. These tests included: cutting tools, form tools, rolling tools, rolling equipment, punches, shears, reamers, etc.

It is a cardinal point that all sharp tools treated by this process must be ground to remove sharp edges. The best procedure is to apply the Dalton-Atom treatment immediately after heat treatment and before final finishing operations.

# NEWS

## FEATURES

CONTINUED

### Driverless Bus Tested

A 44-passenger bus has been displayed in Dallas, Tex., that starts and stops itself and maneuvers through a 108-in. space without a driver.

Manufactured by the Flexible Co., Loudonville, O., and Barrett Electronics Corp., Northbrook, Ill., the bus was demonstrated for members of the American Transit Association. It is powered by a Diesel engine. An electronic guidance system tuned to a cable taped to the pavement operates the bus.

A. M. Barrett, president of Barrett Electronics, says "We've licked all the technical and economic problems. All we've got to do now is sell the buses."

Mr. Barrett estimates the electronic guidance system will add about \$5000 to the cost of each bus, making each vehicle cost about \$32,500.

The automatic bus is called a substitute for subway or rapid transit equipment. Mr. Barrett says a train of the new vehicles would slash subway or rapid transit costs sharply because it would eliminate the expense of laying and maintaining tracks. It would need only the guidance cable and two narrow bands of cement for the roadway.

Looking to the future, Flexible and Barrett are working on an automated bus that could travel on crowded city streets. It would have its own radar system and would slow down or halt when nearing another object.

Mr. Barrett explained an electric current runs through the guide cable in the pavement. The current creates an electro-magnetic field which is "sensed" by a small bar under the bus. If the cable curves, the bar loses touch with the electro-

magnetic field, and triggers a hydraulic steering device. This turns the steering wheel to keep the bus on the track. A break in the cable activates the brakes.

### Air Pollution Study

A new program to continuously monitor air pollution in eight major U. S. cities has been started by the U. S. Public Health Service.

The first station went into operation at Cincinnati and others will begin operations shortly in Chicago, Detroit, Los Angeles, New Orleans, Philadelphia, San Francisco, and Washington.

The stations have been designed to provide automatic sampling and analysis of gaseous pollutants, air particles and wind turbulence.

### SAE's Fuels Meeting

The National Fuels and Lubricants Meeting of the Society of Automotive Engineers will be held Nov. 8-10 at the Shamrock Hilton Hotel in Houston, Tex.

Over 600 engineers, scientists, executives and students are expected to attend. Featured dinner speaker will be Wernher von Braun, Director, Marshall Space Flight Center, National Aeronautics and Space Administration.

### German Output Rises

West German automobile production during the first seven months of 1961 jumped 7.2 per cent over the 1960 period to 1.25 million units, the Automotive Industry Council has announced.

### MOBILE SNOW MELTER TESTED



New York City officials test snow melter built by Thermal Research & Engineering Corp., Conshohocken, Pa., from an original concept by Esso Research & Engineering Co. Fifty tons of shaved ice were disposed of in 30 minutes. Front end loaders dump snow into heated water and it melts almost instantly.

# New BMW 1500, VW 1500 Convertible, Opel and Taunus Star at Frankfurt Show

By David Scott  
British Correspondent

The German auto industry traditionally saves its fresh offerings for the biennial Frankfurt Motor Show, and the display this year revealed a fair crop of new cars.

Bayerische Motoren Werke introduced its BMW 1500 powered by an overhead camshaft four-cylinder engine mounted at a 30-degree tilt. Of 91.4-cu in. displacement, it develops 75 hp at 5500 rpm, and features a five-bearing crankshaft, chain-driven oil pump, and water-heated intake manifold. The four-speed gearbox has Porsche-type synchromesh on all forward ratios.

## Independent Suspension

Suspension is all-independent, the front wheels using MacPherson-type struts combined with pressed-steel lower links and a transverse anti-roll bar. Rear wheels are carried on Y-form box-section trailing links pivoting on Silentbloc bushes, and supported by coil springs supplemented by air cushions.

Drive from the rigid differential is through universal-jointed and splined half-shafts, and the entire suspension assembly is on a fabricated subframe whose transverse members are angled upwards slightly (so vertical wheel travel is matched to the steering geometry). The frame is attached to the integral body at three points with rubber mountings.

Rear wheels are braked by drums, front by disks.

## Twin Carburetor Engine

BMW also presented the 3200 CS coupe powered by a two-carburetor version of its 193-cu in. aluminum V-8 engine. With 9:1 compression this develops 160 hp at 5600 rpm. All wheels are sprung by torsion bars, and have Dunlop disk brakes. Built on a 9-ft, 3-in. wheelbase, this luxury model has a separate chassis and a body styled by Bertone.

While the VW 1500 was widely publicized before the show, Volks-

wagen unveiled the convertible version at Frankfurt. Unlike the previous open-air model, it has a fabric top that recesses nearly flush with the body, and includes a large rear window. The Ghia-designed convertible body is made by Wilhelm Karmann in Osnabrück.

## Engine Only 16 In. High

Compactness is the keynote of the flat-four engine, which is compressed into a package only 16 in. high to give space for a shallow trunk above it at the rear of the car. The cooling blower is mounted directly on the crankshaft tail, the oil cooler is over the left bank of shrouded cylinders with the belt-driven generator behind it, and the oil-bath air cleaner is over the right-hand bank. Exhaust pipes are finned and cowed to provide effective forced-air heating for the interior.

The four-speed transmission is virtually the same as on the smaller car, and positioned ahead of the engine. Suspension also is very similar, although front wheels are now sprung by round instead of

laminated torsion bars, arranged in a different configuration.

Production of the VW 1500 will start at about 200 a day against some 3400 of the older model, and the Wolfsburg factory plans to raise output gradually to 500 daily.

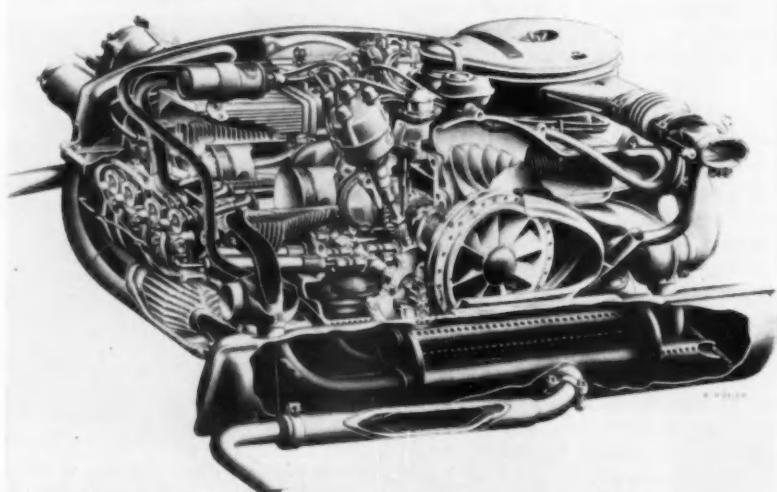
## Rekord's Roof Lowered

Opel (GM) displayed the Rekord coupe, following the trend of European manufacturers to add a sporty-looking or high-performance model to their basic ranges. Distinctive feature is the low-line roof, reducing overall height to 55.3 in. Seats have been lowered to give adequate headroom for four adults. The lavish interior includes front bucket seats with reclining backrests as standard. The 102-cu-in. engine with 8:1 compression puts out 66 hp at 4300.

German Ford came up with the Taunus 17M "TS" sedan which boasts a pepped-up four-cylinder engine. Bore is enlarged to increase displacement to 107 cu in. and compression raised to 8.5, resulting in 77 hp at 4750 rpm. While the Cologne factory pioneered the hollow crankshaft in Europe, it has reverted to a solid casting for this engine.

## Fuel Injection Mercedes

Daimler-Benz showed the latest additions to its range, highlighted by the Mercedes 300SE super-luxury sedan with fuel-injection light-



Squat VW 1500 Engine Is Only 16 In. High

# NEWS

## FEATURES

CONTINUED

alloy engine, four-speed automatic transmission, air suspension, servo steering, and disk brakes on all wheels. Another new model was the 220SE convertible, also with fuel injection on its 134-hp engine.

Among the smaller German car makers, NSU unveiled the Prinz IV whose styling is admittedly inspired by the Chevrolet Corvair. The rear-engined sedan is barely 11 ft long, and the boxy form of the body gives maximum space for four people plus an adequate front trunk. Shallow pressings of light-gage steel save weight and reduce production costs.

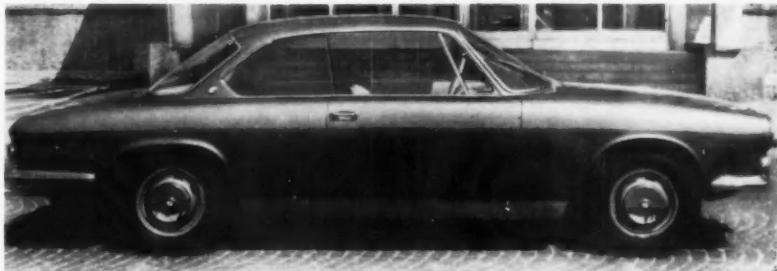
### Uses 30-HP Engine

Although this car may ultimately be powered by the Wankel rotary-piston engine now under intensive development by NSU, the present unit is the company's existing 30-hp overhead camshaft air-cooled twin.

Hans Glas has progressed from the baby to the small-car class with the S-1004 coupe, shown here for the first time. The four-cylinder water-cooled engine, delivering 42 hp at 4800 rpm, is distinguished by a belt-driven overhead camshaft. The belt from the crankshaft pulley is toothed to prevent slipping, and reinforced with steel wires to resist stretching.

### Tank Track Order

Firestone Tire & Rubber Co. has received an order to produce \$5.5 million worth of tank tracks and wheels for M-113 armored personnel carriers. They will be manufactured at the Firestone Industrial Products Co. plant, Noblesville, Ind.



**BMW 3200 CS Coupe has Twin-Carburetor V-8 Engine**



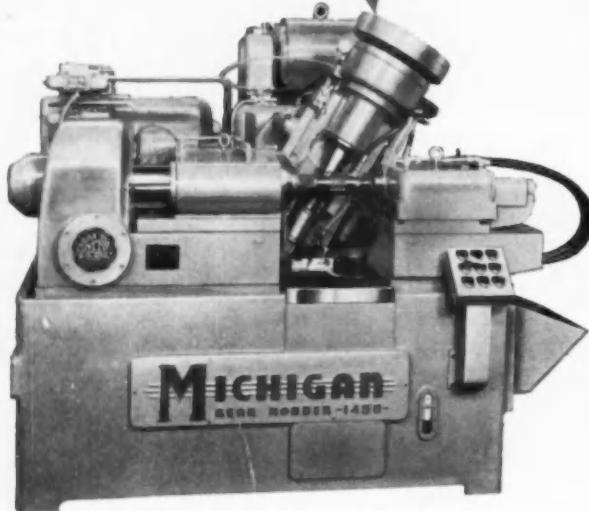
**Opel Rekord Coupe Features Low, Swept-Back Roof**



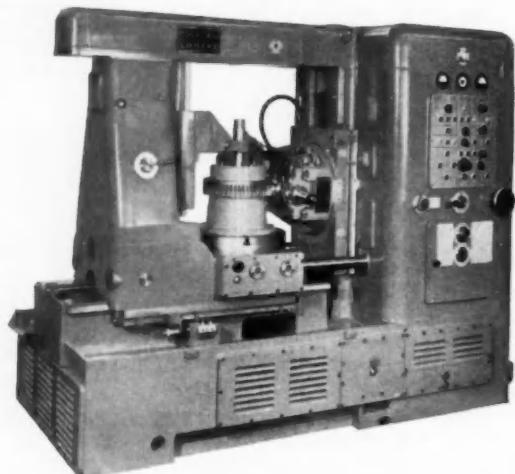
**Rear-Engined NSU Prinz IV Resembles Corvair**

# Why EUROPE wanted U.S. hobbers

# Why WE added LORENZ designs



Michigan 1458B hobbers are available for gears up to 12" OD and 4 1/4" face width. Ask for Bulletin # 1458-61.



Michigan-Lorenz hobbers are available in 3 styles for gears up to 24" capacity. Ask for Bulletin # ML-61.

IN EUROPE, industry has extensively switched to mass production methods and equipment. This calls for machines that will stand the gaff day after day in continuous production. One major company decided to test all hobbers... European and American. The MICHIGAN 1458B hobber was found the ideal machine despite higher cost than for European machines. It gave top output, high accuracy, minimum downtime, freedom from service troubles. Since then, Europe has been a repeat buyer of 1458B hobbers.

If you want to cut your production hobbing costs, you too will find the 1458B the machine that can really do it.

IN THE UNITED STATES, gear producers who needed more versatility with high accuracy and low cost have eyed European hobbers for some time. Michigan Tool Company joined them and found that the design of the German Lorenz line of hobbers came closest to meeting U.S. needs. An engineering arrangement was made and today, as the MICHIGAN-LORENZ line, these versatile hobbers are available as American-built machines produced by Michigan Tool Company.

If you need top versatility with accuracy and ruggedness—you too will find MICHIGAN-LORENZ hobbers (and shapers) will cut your costs.



**MICHIGAN TOOL COMPANY, 7171 E. McNICHOLS RD., DETROIT 12, MICHIGAN**

# MENT

## IN THE NEWS



Ford Motor Co., Tractor and Implement Div.—**J. G. Murphy** has been promoted to traffic manager.



Ryan Aeronautical Co.—**Robert C. Jackson** has been elected president.



Saginaw Bearing Co.—**M. C. Patterson** has been elected president and treasurer.



Waukesha Motor Co., Climax Engine Mfg. Div.—**Albert W. Jordan** has been promoted to chief engineer.



Zollner Corp.—**P. L. Bowser** has been promoted to vice president-manufacturing and has been elected a director.



Bendix Corp., Kansas City Div.—**Arthur J. Raymo** has been appointed director of manufacturing.

Goodyear Tire & Rubber Co.—**G. Nelson Chambers** has been appointed managing director of the new Turkish subsidiary.

Purolator Products, Inc.—**Bernard R. Heymann** has been named chief engineer of aircraft manufacturing facilities at Van Nuys, Calif.

Towmotor Corp.—**Galen Miller** has been elected president and **Robert L. Fairbank** has been appointed executive vice president.

Allis-Chalmers Mfg. Co.—**T. D. Lyons** has been promoted to a vice presidency and **W. S. Pierson** has been named controller.

Electric Autolite Co.—**Donald M. Brown** has been named product manager of the Electrical Products Group.

Dura Corp., Weaver Mfg. Div.—**John Carroll, Jr.** has been appointed controller.

Schlegel Mfg. Co.—**Emil Pieper** has been named quality manager.

Studebaker-Packard Corp., Automotive Div.—**William L. Wood** has been appointed merchandising manager.

Willys Motors, Inc.—**L. Earl Harpst** has been promoted to director of overseas manufacturing.

Marquette University—**Robert S. Johanson**, formerly public relations director for AC Spark Plug Div., General Motors Corp., has been named public relations director.

Mack Trucks, Inc.—**Albert R. Carpenter** has been appointed controller.

Yoder Co.—**William J. Kerr** has been appointed vice president-development.

Correction—Because of a typographical error in the Oct. 15 issue of Automotive Industries, Leonard W. Mawhinney was named as president of Metal & Thermit Corp. Mr. Mawhinney actually was named a vice president. Charles J. Beasley is president of M & T.

Detroit Broach & Machine Co., Machine Div.—**Hugo Swan** has been named superintendent.

International Harvester Co., Construction Equipment Div.—**D. O. Stevenson** has been named general supervisor of product quality.

Metal & Thermit Corp., Plating Div.—**Chester G. Borlet** has been appointed plating products specialist.

United States Rubber Co.—**Allen W. Stoner** has been appointed manager of the synthetic fiber research dept. at the Wayne, N. J. research center.

Borg-Warner Corp., Ingersoll Kalmar Div.—**Carl von Linsowe** has been appointed vice president and director of engineering.

### Necrology

**Herbert H. Nigg**, 72, former controller and secretary-treasurer of the Warner Automatic Parts Div. of Borg-Warner Corp., died Oct. 15 in Caro, Mich.

**William J. Brown**, 77, retired treasurer and a director of Bethlehem Steel Corp., died Oct. 11 in Oceanside, L. I.

**William A. Humel**, 66, vice president and general manager of the Park Drop Forge Co., died Oct. 9 in Shaker Heights, O.

**John D. Hertz**, 82, founder of the Hertz car rental system and of the Yellow Cab Co., which later merged with General Motors Corp., died Oct. 8 in Los Angeles.

**Howard J. Daly**, 64, vice president and director of the Norton Co., died Oct. 7 in Niagara Falls, N. Y.

**Walter B. Groves**, a member of the board of Tecumseh Products Co. and former operator of a carburetor plant, died Oct. 4 in Detroit.

**Jess D. Chamberlin**, 77, former purchasing executive for General Motors Corp., died Sept. 30 in Detroit.



This is  
AMERICAN OIL  
COMPANY  
in action

## How AMOCOOL\* Transparent Coolant

### helped improve profit picture in this plant

Eliminate reworking because of rust, reduce wheel loading and extend intervals between wheel dressings; do these and you increase profit per unit, explains Detroit Edge Tool president, Dan Ebbing, to P. E. "Pappy" Stratton of American Oil. Sam Vineh, operator, looks on.



by PAUL E. "PAPPY" STRATTON  
**About the Author.**

"Pappy" Stratton has been providing technical help on lubrication and metalworking problems to customers in the Detroit area for nearly all of the twenty-five years he has been working for the company. In addition to having this store of practical experience to help him, Pappy has completed the Company's Sales Engineering School.

★ ★ ★

By using a soap-base grinding compound, Detroit Edge Tool Company was getting excessive corrosion and rust on work and grinding machines. Oil vapor was collecting on machines

and on the ceiling, causing dirty working conditions. Most important, high wheel loading was causing frequent down-time for wheel dressings.

We worked out a test program on AMOCOOL Transparent Coolant with the management. On our first test on one surface grinder, feed pressure was cut substantially while at the same time metal removal was increased.

The cost of reworking parts to remove rust was eliminated. Time required to clean machines to get rid of the odor was cut in half. Less wheel loading and fewer wheel dressings have upped production and reduced costs. Our test program paid out in an improved profit picture. All grinding

and drilling equipment has been converted to AMOCOOL Transparent Coolant.

★ ★ ★

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an Editorial



## Flirting with Folly

**T**HE CONSTANT TEMPTATION EXISTS for legislators to try to substitute laws for the natural technical and scientific processes of improvement. For example, it has recently been proposed that national safety standards be set by the Federal Government for the design and manufacture of automobiles. In offering the proposal, it was conceded that such an action would increase the costs of the vehicles.

PROPOSALS OF THIS TYPE DESERVE the closest scrutiny. Questions must be asked about the effect of such kinds of legislation upon such important aspects as the restraint of original design potentials, the regimentation of production, and the eventual emergence of obsolescence in even the processes of government used for enforcement of such laws. The past experience of government in regulating other industries must be studied.

THE HISTORY OF GOVERNMENT in regulating safety has not been very impressive. A good example is the case of the operation of the railroads. There are thousands of railroad cars operating today, despite the safety concepts of the I. C. C., which are equipped with windows which shatter into countless sharp fragments dangerous to passengers when they are broken. The effect of government regulation here has been to perpetuate the use of dangerous designs, rather than to require the use of safe designs. Thousands of windows of railroad cars are broken

annually resulting in painful injuries to passengers, despite the laudable purposes of I. C. C. regulations. In brief, the idea of substituting laws for technological innovation has little practical merit when viewed over the span of years in which the regulation-ridden railroads have operated.

THE GENERAL IDEA OF LEGISLATING engineering functions in the automotive industry is a flirtation with folly. The enterprise of the industry has been a big factor in the reduction of fatality rates on America's highways. The rate per 100 million vehicle miles has dropped from 15.9 in 1935 to 5.3 last year. The gain is a significant barometer of the merit of the advances in car design and production originating from the industry's own drafting boards and design studios.

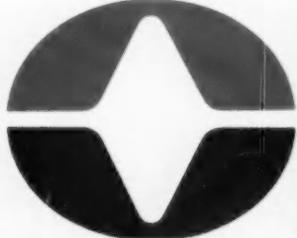
NOW THE INDUSTRY IS CONFRONTED by the total challenge of world-wide competition with companies operating under much more favorable environments as far as government relations is concerned. Tax benefits, virtual subsidies, promotional aids, and a myriad of other advantages are designed and developed by governments in other countries to help their own automotive manufacturing plants. Instead of planning to impose more stringent restrictions, our federal legislators might do well to plan some broad liberalization programs to relieve the industry of some of the excessive restraints which exist at the present time.

*Harry W. Barclay*

Editor and Publisher

# Western BRASS

(Before)



# Olin BRASS

(After)

The letterheads have been printed, signs made...and here we are wearing a new name. But in the mills things go on pretty much as they always have. We've put in some new machines and broadened our line...but essentially it's the

people at Western (oops!) Olin Brass that really make the product. They *care*. That's the "Tailor-Made" approach.

If you're an old customer you know what we mean. If you're not—ask one of our users. Chances are he'll tell

you the uniform quality and individual engineering of his metal has managed to save him money in inspection, fewer rejects and less lost time.

Olin Brass can do the same thing for you.

We're the same folks.

(Brass sales headquarters at East Alton, Illinois)

METALS DIVISION **Olin**  
400 Park Ave., New York 22, New York.

1000-lb aluminum log  
being lowered  
into Ajax  
melting furnace  
at Pontiac foundry

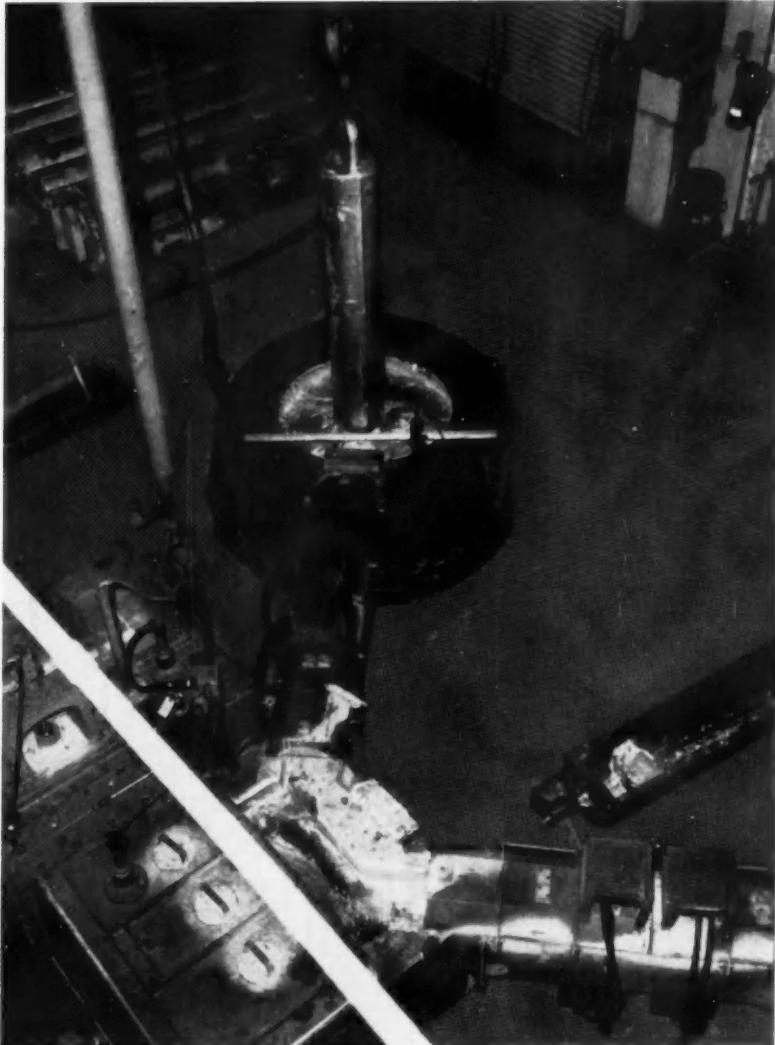
BY  
**HARTLEY**  
W.  
**BARCLAY**

# How Suppliers Cooperate In Pontiac Reliability Program

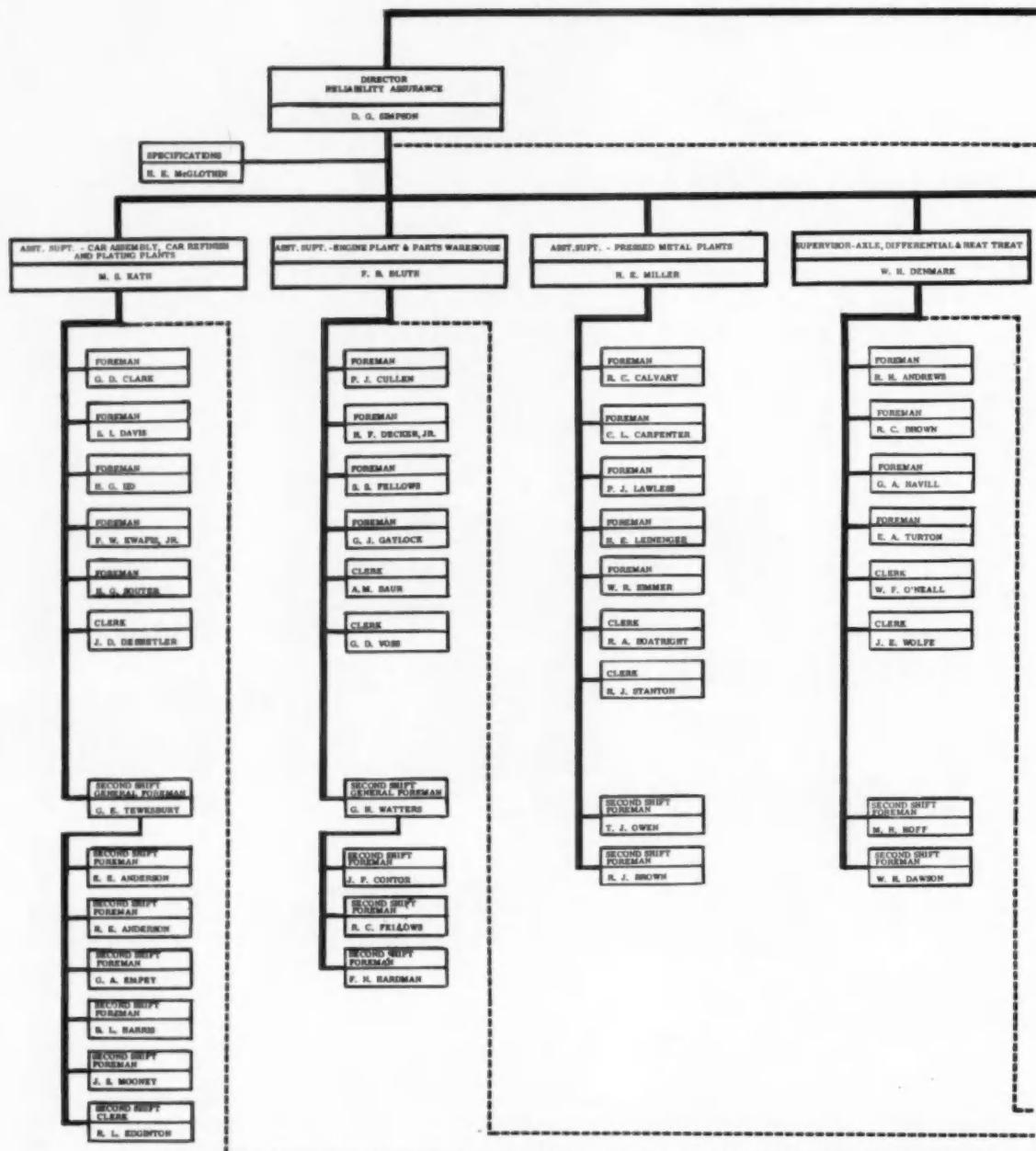
**The main plant of Pontiac assembles 40 per cent of all Pontiacs and 80 per cent of all Tempests. All engines, pressed metal parts, axles and differentials, and over 500 other parts are supplied to BOP plants from the main plant**

**O**NE of the most completely developed "Reliability Assurance" programs in the industry has been installed at the Pontiac Division of General Motors Corporation. The program was effective in early 1961 and was used in quality control of 1962 parts. During a recent plant visit, through the courtesy of H. A. C. Anderson, director of reliability for this division, a number of *AI* editors and executives received the privilege of studying the entire operation of this program at close range. The total operations of the Reliability Staff involve so many functions important to the successful working of the plan, that more than one editorial feature will be required in order to provide a full description. This report will be confined to the aspects of supplier cooperation.

During the introduction of the program, the expectations of the Pontiac Division concerning supplier cooperation were brought to the attention of every listed vendor by M. F. Rummel, director of



## RELIABILITY DEPARTMENT ORGANIZATION



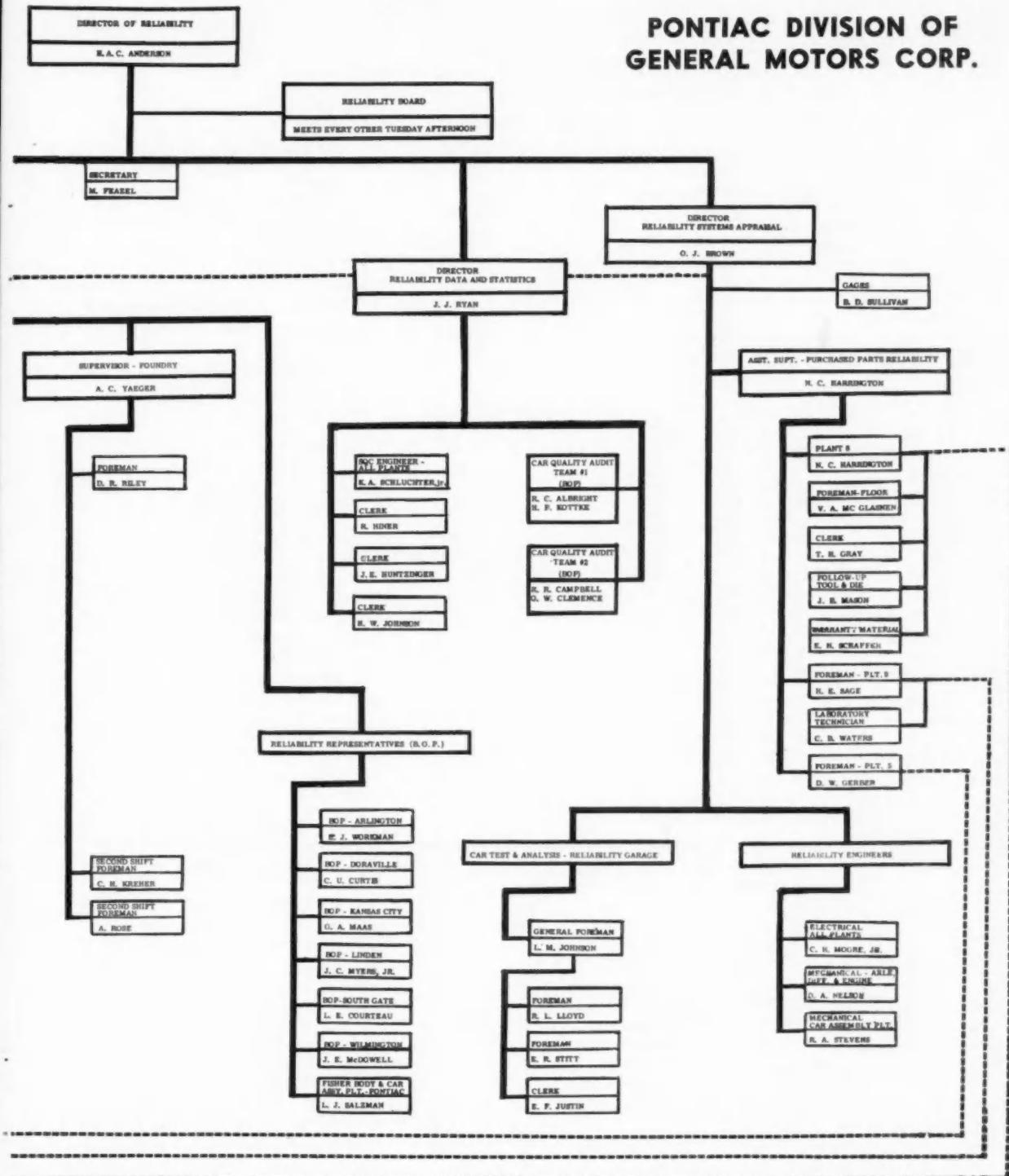
purchasing. Each supplier was told that "we are confident that you are aware of the degree product quality and reliability affects our mutual well-being. Consumers are de-

manding more in quality and reliability than ever and past standards, in many cases, are no longer sufficient.

"We at Pontiac welcome this

challenge as it reaffirms our basic philosophy we have had in practice. However, it would not be prudent on our part to be satisfied with present accomplishments. This Di-

## PONTIAC DIVISION OF GENERAL MOTORS CORP.



vision and its Supplier Group, with maximum teamwork must continuously strive to find ways to bring into our product higher degrees of quality and reliability.

"One of the many ways that Pontiac Motor has established to accomplish this mutual goal is to carefully test Supplier production samples and build cars on a limited vol-

ume basis prior to the start of our regular production. We have found both of these programs to be very beneficial in the past."

In order that suppliers might be

General Motors Corporation  
**PONTIAC MOTOR DIVISION**  
**SUPPLIER PRE-PRODUCTION CERTIFICATION REPORT**

PONT. 3716

ATTENTION: PURCHASED PARTS RELIABILITY DEPARTMENT  
PONTIAC MOTOR DIVISION

COPY TO: SUPPLIER FILE

PLANT NO. \_\_\_\_\_

We are submitting the following pre-production material for your approval:

Part Number \_\_\_\_\_ Quantity \_\_\_\_\_

Part Description \_\_\_\_\_

Manufactured to blueprint and specification sheet dated \_\_\_\_\_

We certify that this material meets the following conditions:

1 - This material has been checked by our personnel and found to meet all blueprint specifications, contour models and appearance models when provided by Pontiac Motor Division.

2 - This material is representative of the quality and quantity we expect to manufacture on a production basis.

This material was manufactured by the following method:

Place check in appropriate block.

1 -  With complete production tooling.

2 -  With production tooling except as noted below.

**SPECIMEN COPY**

Signed \_\_\_\_\_ Supplier Name \_\_\_\_\_

Title \_\_\_\_\_ Date \_\_\_\_\_

**INSTRUCTIONS**

1 - This form must be filled out for each part number and shipment submitted.

2 - A copy for our Purchased Parts Reliability Department must accompany the shipment and be retained for inspection.

3 - A copy to be retained for Supplier File.

4 - The package must be labeled with a blue label titled "Pontiac Pre-Production Material" (Pontiac form - PONT. 3720).

Never send pre-production material via parcel post, rail express, air freight, air express, air mail or carload unless directed by Follow-Up man at Pontiac Motor Division.

### **PONTIAC PRE-PRODUCTION CERTIFICATION REPORT FORM**

informed about the details of what is expected of the Supplier Group with regard to the Pontiac Sample and Pre-Production programs, a booklet of required procedures was published and circulated. A new feature of the Pontiac requirements included in this booklet is the requirement for the "Supplier Sample and Pre-Production Certification Report." These certification report forms are shown in illustrations accompanying this article.

#### **INFORMATION REQUIRED FROM SUPPLIERS**

Suppliers of all types were told that it is very important for the

Pontiac Division to have an up-to-date resume on all production tooling and sample progress. To insure the Division of having this key information, Suppliers are asked to furnish "by Monday of each week" through the use of letter or wire, the following information on new parts, shown by part number:

1. Estimated percentage of completion on tools.
2. Estimated date tools will be complete.
3. Estimated date samples from production tools will be submitted.
4. List any unusual delays in tooling progress or "where Pon-

iac Motor Division is or will be impeding progress due to a lack of a decision, blueprint, model, etc."

The report containing the above information is directed by the Supplier to the attention of the Purchasing Dept. "Follow-up Man" held responsible for the Supplier's account.

#### **ORGANIZATION OF RELIABILITY STAFF**

The function of "Reliability" is a complete department within the Pontiac organization structure. The organization chart of the Reliability Department, shown in an accompanying illustration, shows graphically how the department is inter-related with purchasing, warehousing, production, assembly and other major functions of the Division.

#### **PRODUCTION SAMPLE PROGRAM**

The first step of supplier cooperation with Pontiac, after receipt of a purchase order, is the function of cooperation in the "Production Sample Program." The objective of this program is "to prove that supplier production tooling will produce parts that meet all blueprint specifications . . . contour and appearance models. . . . And also, to prove that suppliers have interpreted blueprint specifications correctly."

The procedure involved here is as follows: Samples from complete production tooling must be submitted and approved by the Pontiac Purchased Parts Reliability Department before production shipments can be made. Handmade parts or parts made by any other method other than from production tools are not to be submitted for sample approval. Samples are not required for carry-over parts used in a previous annual model. Samples must not be submitted unless the supplier's engineering and inspection personnel are completely satisfied that the samples meet all blueprint specifications, contour and

General Motors Corporation

## PONTIAC MOTOR DIVISION

## RELIABILITY DEPARTMENT

## PRODUCTION SAMPLE REPORT

MODEL \_\_\_\_\_ DATE \_\_\_\_\_

Part Name \_\_\_\_\_ Part No. \_\_\_\_\_

Received \_\_\_\_\_ Checked to B/P Dated \_\_\_\_\_ Weight Each \_\_\_\_\_

From \_\_\_\_\_

Address \_\_\_\_\_

Samples were received and \_\_\_\_\_

**SPECIMEN COPY**

- OK FOR PRODUCTION** proceed with production shipments in accordance with requirements as shown on the "Purchase Order and Shipping Release" (Pontiac form - 4053).
- CORRECT AND PROCEED** proceed with production shipments in accordance with requirements as shown on the "Purchase Order and Shipping Release" (Pontiac form 4053) PROVIDING SUCH PRODUCTION INCORPORATES CORRECTIONS WHICH WILL ELIMINATE COMPLAINTS DETAILED ON THE PRODUCTION SAMPLE REPORT.
- REJECTED - NEW SAMPLES REQUESTED** NEW SAMPLES INCORPORATING CORRECTIONS TO PRODUCTION TOOLS MUST BE SUBMITTED AND APPROVAL RECEIVED BEFORE PROCEEDING WITH PRODUCTION SHIPMENTS.

Signed \_\_\_\_\_ PURCHASED PARTS RELIABILITY DEPARTMENT

COPIES TO:  
 DIRECTOR OF RELIABILITY  
 PURCHASING (2 COPIES)  
 PRODUCTION CONTROL  
 PRODUCT ENGINEERING  
 PURCHASED PARTS RELIABILITY DEPT.

## PONTIAC RELIABILITY PRODUCTION SAMPLE REPORT FORM

appearance models.

Unless otherwise specified, Pontiac requires a minimum of eight (8) samples. Results of the Pontiac Purchases Parts Reliability Department's inspection of each group of production samples, as well as production shipments, become a part of the Pontiac record on that supplier. A report summarizing such record and giving the Division's appraisal of substandard suppliers, from a quality standpoint, is issued.

Furthermore, invoices covering tooling costs are not to be approved for payment by the Pontiac Purchasing Department until a sample

approval report is issued by the Reliability group. Each production part sample shipment must be accompanied by a "Supplier Sample Certification Report" (Pontiac Form 3712), properly completed by those responsible at the supplier's plant. This report must be enclosed in the container with the samples. The Reliability staff will not process any samples which do not have a Supplier Sample certification report enclosed with the samples. Each shipment must be identified with an orange label titled "Pontiac Production Samples." (Pontiac Form 3730).

The findings of the Pontiac Pur-

chased Parts Reliability Department is reported through the use of Pontiac Form number 1212. Upon receipt of this report from the Reliability Department, the buyer's office mails a copy of the report to the supplier. Normally, one of three conditions will exist, as reflected by this report. These are as follows:

1. "OK for Production"—allows the supplier to proceed with production shipments in accordance with requirements as shown on the Pontiac Purchase Order and Shipping Release. (Pontiac Form 4053)

2. "Correct and Proceed"—allows the supplier to proceed with production shipments provided that such production incorporates corrections which will eliminate complaints detailed on the production sample report.

3. "Rejected — New Samples Requested"—means that new samples incorporating corrections to production tools must be submitted and approval received before proceeding with production shipments.

## SHOW AND PILOT CAR PROGRAM

An entirely separate program of "Reliability Assurance" has been developed to apply to the operations of suppliers submitting parts for Show and Pilot Car projects at Pontiac. While the program is separately conducted, its methods of operation are somewhat similar to the "Production Sample Program." Interested suppliers can obtain complete details by requesting information from the "Purchasing Department."

In discussing the Purchases Parts Reliability program with Pontiac executives we have the distinct impression that it is effective because of its enthusiastic reception by all the major departments involved. These include Material Control, Manufacturing, Product Engineering, as well as Purchasing and Reliability, who all cooperate with each other and Pontiac's "fine group of suppliers" to assure maximum product reliability. ■

# "INSIDE" Purchasing AT CHRYSLER CORPORATION

*The first comprehensive and complete description of the current organization and operation of the purchasing staff at Chrysler*

SEVERAL years ago (see AI, November 1, 1959) we described the initial stage of a fresh concept of management in Chrysler Corporation—the principle of centralized control of manufacturing operations. In this concept the responsibility for operating all manufacturing and assembly plants begins with direction and control at the corporate level and is extended through group vice-presidents to individual plant managers within a group.

Since then the setup has been progressively refined and has experienced normal changes in personnel with the passage of time.

It is only natural to expect that this radical change in management philosophy should also affect the procedure for the selection and purchase of machinery and all manner of plant equipment for the nation-wide complex of Chrysler plants. As a matter of fact, there has been a radical change and, as one may expect, it involves a chain of command that could be puzzling to anyone outside of the management group.

Our object here is to summarize the situation as simply and as clearly as this complex setup permits.

It is important to note at this point that numerous functions are involved in the process: the corporate staff, group vice-presidents and plant managers; central staff engineering with all its branches; manufacturing engineering at the various levels; and purchasing department activities at the various levels.

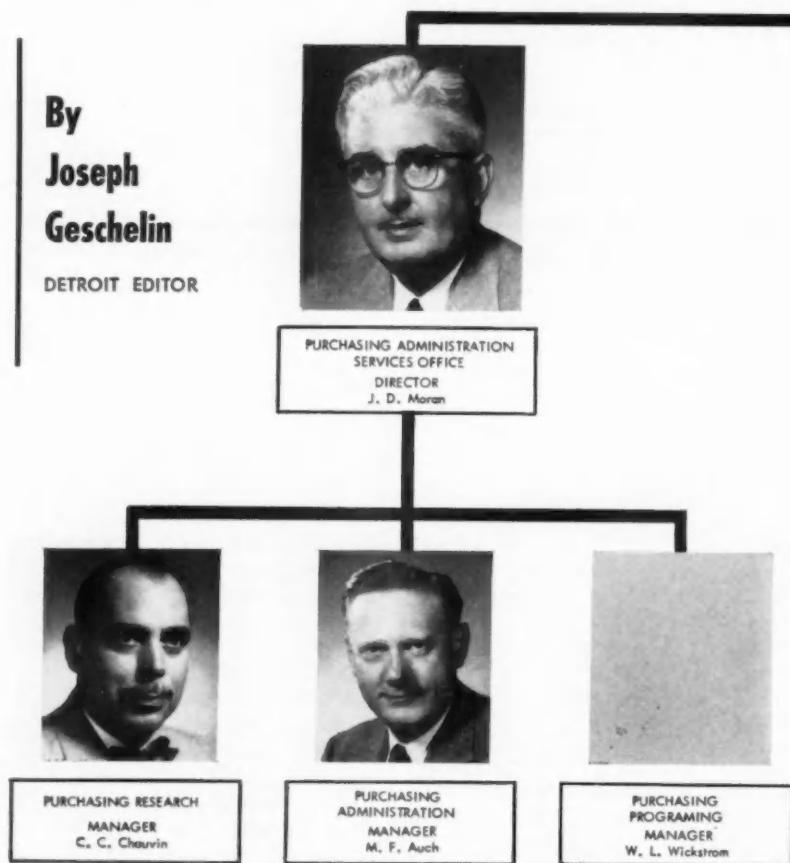
Few people, even among the suppliers, realize the complexity of the influences in selecting, approving and buying major items of manufacturing equipment. Here we have a signal opportunity to trace such influences with the cooperation of Chrysler management. This should be of vital interest to some 12,000 suppliers of record.

Consider the organization of the

purchasing department. As seen in Chart I there is the Corporate Purchasing Staff, under the direction of vice-president B. W. Bogan, and headed by W. C. Cawthon. Then there is purchasing organization at group and plant levels as shown in Chart II. All of this group is under the direction of W. C. Cawthon, communicating with the corporate staff by way of H. C. Cook, the divi-

By  
**Joseph  
Geschelin**

DETROIT EDITOR





## CHRYSLER CORPORATE PURCHASING STAFF

*Chart 1*

VICE PRESIDENT  
B. W. Bogen



CORPORATE PURCHASING STAFF  
DIRECTOR  
W. C. Cowher



SUPPLIER RELATIONS  
DIRECTOR  
E. Lloyd



CHASSIS & ELECTRICAL PARTS  
PURCHASING DEPARTMENT  
PURCHASING AGENT  
J. W. Snyder

PURCHASING AGENT  
BODY PARTS PURCHASING  
DEPARTMENT



MATERIALS & SERVICES  
PURCHASING DEPARTMENT  
PURCHASING AGENT  
R. D. Morrison



DIVISIONAL COORDINATION  
DIV'L. PURCHASING COORD.  
H. C. Cook

• AUTOMOTIVE MANUFACTURING  
GROUP  
• ENGINEERING DIVISION  
• INT'L. OPERATIONS GROUP  
• DEFENSE & SPECIAL PRODUCTS  
GROUP



RAW MATERIALS & SCRAP  
MANAGER  
D. Sneddon

NONPRODUCTION  
PURCHASING  
MANAGER  
A. Fields



BY-PRODUCTS  
SUPERVISOR  
J. R. Bennington

sional coordinator, who, in turn, works through Purchasing Administration Services Office, headed by J. D. Moran.

Threading the maze of communications slowly, we look first at the role of the purchasing organization. As shown in Chart I there is the corporate purchasing staff through which all new buys eventually clear. Unique feature here is Purchasing Research, a group of technical specialists fully capable of analyzing and screening the proposals streaming from group purchasing departments at the plant level. One of their functions is to suggest alternate sources or recommend alternate types of equipment, or newer methods in the interest of upgrading equipment buying and, in the process, probing the possibility of handling a project at lower cost.

As part of the centralized manufacturing organization, all plants are coupled in rational "groups" each one headed by a "group vice-president." Each of these "groups" has its own purchasing department, exclusively for handling purchases of non-productive materials and plant equipment of every variety. These purchasing departments are responsible for presenting the central staff with complete proposals for new programs or for replacement equipment buying. These groups, together, with other forms of manufacturing activities, are shown in Chart II.

Under the new scheme of things at Chrysler, the channeling of proposals from the group purchasing departments to the corporate level is effected through the central office divisional coordinator. He, in turn, presents the proposals to the director of purchasing administration at the corporate level.

It is obvious, therefore, that all purchases of a certain dollar value must ultimately clear through the corporate level and no buys can be made until there is concurrence from the central office.

Up to this point we have examined just the structure of the purchasing organization. What is

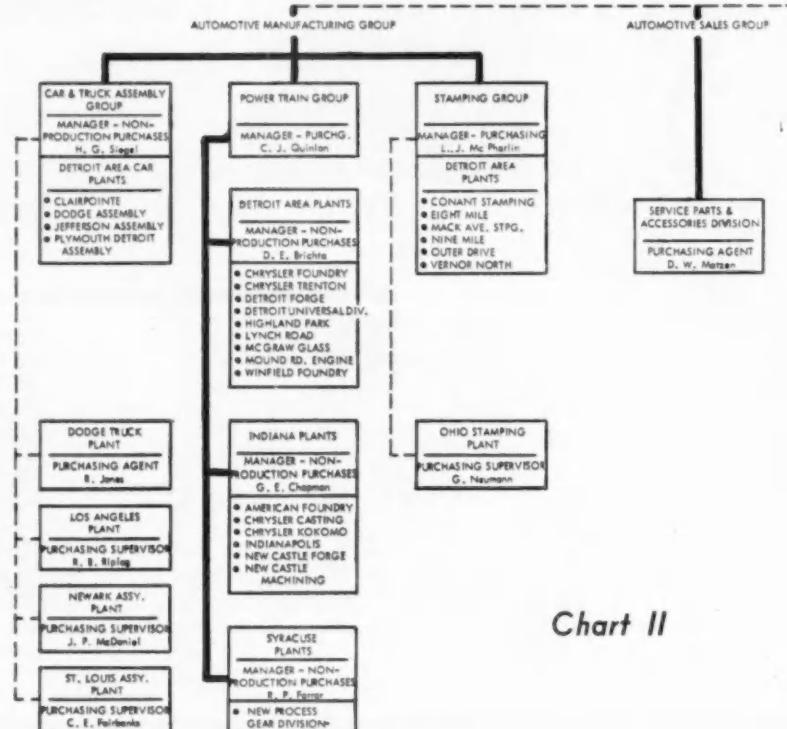


Chart II

the mechanism for initiating the purchase of new equipment, replacing old or obsolescent equipment? By what process are decisions made for building a new plant or changing the setup in an existing plant?

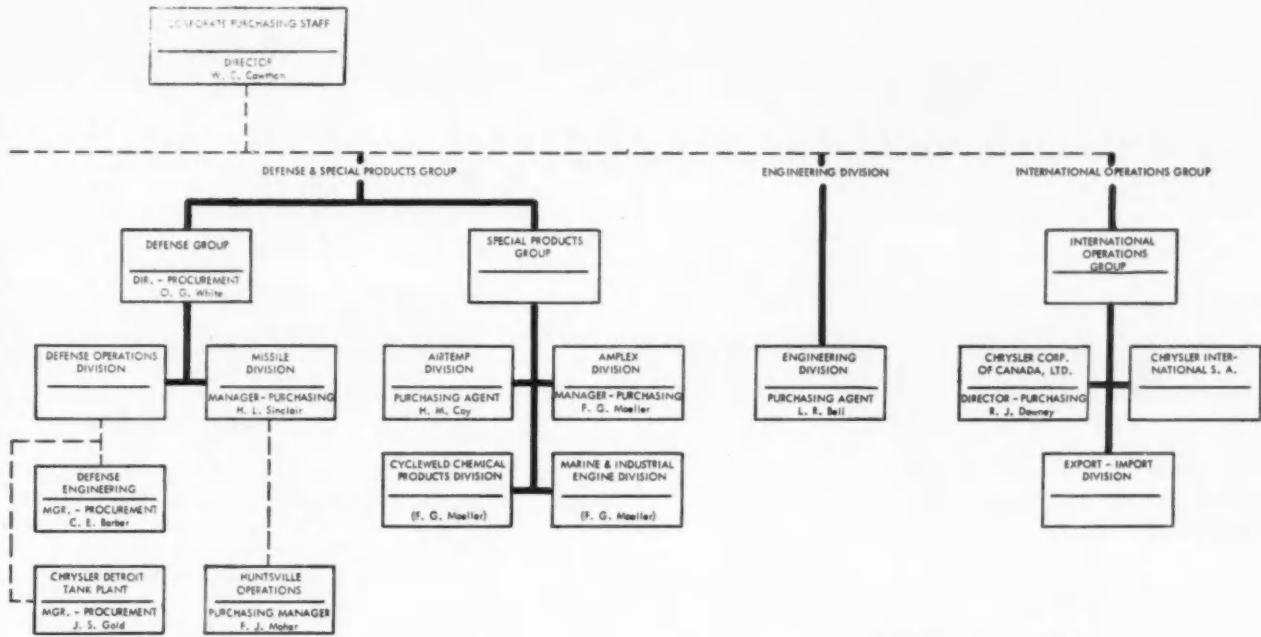
Here we enter the realm of "manufacturing engineering." At the top level is "Manufacturing Engineering—Central Staff." Staffed by specialists in various fields, this group works hand-in-hand with central engineering staff, thus keeping abreast of advance planning for products that may not see the light of day for many years. By such close contact the central staff has an opportunity to plan and dream of major programs in the future. Let us pose one example to illustrate this point.

It is no secret that Chrysler has been active in the development of an automotive gas turbine. What we don't know is when this powerplant will be ready for release for production. This is one area of

activity for the central staff. For we do know that if and when a gas turbine is ready for mass production it will create a revolution in engine building. As we see it, the gas turbine will obsolete all existing engine plants. And it will require methods and equipment which, in all probability, do not exist at the moment. Manufacturing engineering must be prepared to plan such facilities far in advance of production requirements.

Among its other activities, this group engages in the exploration of new methods and advanced equipment; and, in the process, has ample opportunity for recommending new and advanced methods to the various plants. This, then, constitutes one avenue by which new ideas filter through the organization and out to the using plants.

This central staff also initiates new programs for current models or for the next model year, based upon its contacts with central engineering staff and the corporate



## *Chrysler* GROUP, DIVISION AND PLANT PURCHASING ORGANIZATIONS

staff. Here they prepare an outline of a program that has been approved at the corporate level and present it to the cognizant "group" for final action.

Each "group" has its own manufacturing engineering staff. This makes it possible to concentrate on a narrower range of specialization in keeping with the nature of the plants within the "group." These people, naturally, are more familiar and more closely in touch with the needs and problems of their individual plants than are the members of the central staff organization. The "group" staff, therefore, serves to coordinate the activity of all plants in its jurisdiction. It does the initial planning to meet new programs, to provide for new methods and equipment, etc., in consultation with the group vice-president.

At the corporate level the final programs developed by this staff are cleared with the central manufacturing staff heads. In addition,

the technical details of any major program must have concurrence in the central staff-manufacturing engineering. By this chain of communication from the central staff level and through the group vice-president to the plant level, we find the tight control.

Now, each plant of a "group" has the usual setup of a master mechanic and plant engineer. But there is a major departure from their functions as compared with what it used to be and what it is in other companies in our industry. At the plant level, neither the master mechanic nor the plant engineer is charged with responsibility for planning equipment programs. This is the function of manufacturing engineering for the "group." On the other hand, they work in cooperation with group manufacturing engineering and are consulted in connection with any programs affecting their plant operation.

Here again we are dealing with people who are closer to the specific

problems and conditions of an individual plant. They are best fitted to review a new program and suggest changes or modifications in the light of plant conditions.

Ultimately the major responsibility of the plant master mechanic and plant engineer is for the installation and tuning, operation and maintenance of the equipment within their jurisdiction.

One may wonder just how a new method or a radically different kind of machine can get a hearing. The fact of the matter is that such new ideas can get a hearing from an executive at any level. The difference is that if the idea involves a major expenditure, it must clear with the group vice-president, then must be presented by him to central staff for corporate approval.

Ideas for plant changes or improvements, new equipment buying, etc., can originate at any level in manufacturing engineering. But—they must be reviewed by cen-

(Turn to page 88, please)

# New Techniques AT FORD'S FOUNDRIES

By  
**Joseph  
Geschelin**

DETROIT EDITOR

**I**N the current search for engines of advanced design and improved reliability, Ford Motor

Company is also banking heavily on some special techniques in its gray iron foundries aiming at a major reduction in the weight of the larger components such as cylinder blocks, heads, and manifolds. These techniques represent one of the most significant advancements in the foundry art in a great many years.

Behind this development is the fact that Ford people are convinced that cast alloy iron is uniquely suited for engine components. They cite a number of reasons for this

preference: the fact that cast iron contains free graphite in its matrix is important since graphite is a natural lubricant. Moreover, graphite has a tendency to attract and retain minute particles of engine lubricant, thus assuring lubrication under conditions that might induce scuffing. Another consideration is that cast iron has excellent sound and vibration damping properties. And finally, they feel that cast iron has ideal thermal expansion characteristics for powerplants that must function properly under all manner of temperature conditions.

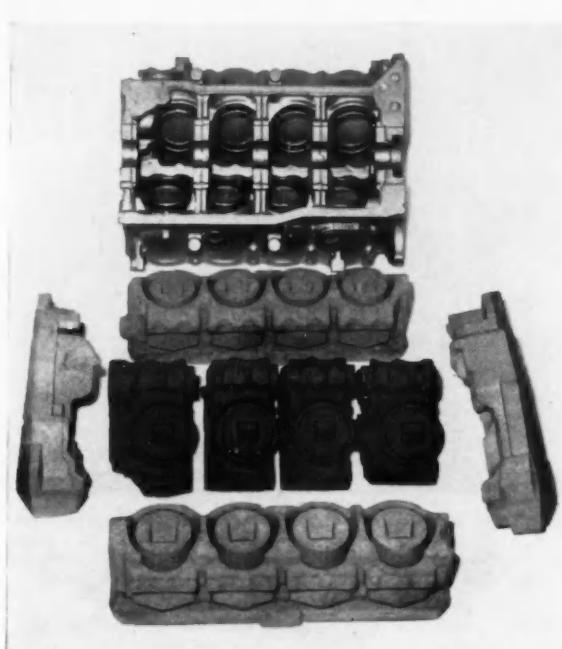
In past practice, the limitations of the casting process dictated the thickness of sections. Objective of the current work has been to seek improvements in techniques that will produce castings with thinner and better-controlled wall thickness—in some instances the thickness being dictated by the engineering requirements for strength.

Although Ford is not alone in the adoption of advanced foundry methods for 1962 engines, the fact is that the company pioneered in this development in the production of cylinder blocks and heads for the 140- and 170-cu in. 6-cylinder engines which have been in use since the introduction of the Falcon and other compacts in the Ford family. For better or for worse, this information was not made public at the time.

Before going into the details of how light-weight castings are produced, let us emphasize that the process not only makes for lighter castings; it also makes for castings



*An intricate segment of the 221-cu-in. V8 engine intake manifold core is removed from one of a battery of new core-blowing machines at the Ford Cleveland foundry. Well able to withstand normal handling immediately upon removal from the machine, this core would have been extremely delicate and dimensionally unstable just a few years ago until it had been baked in a separate oven.*



**A finished cylinder block casting for the 221-cu in. V-8 engine, together with some of the major cores produced by the hot box method. The cores on each side of the central group provide for the coring of the ends of the block for timing gears and other components.**



**A group of blown cores for intake and exhaust ports, water passages, and other areas in cylinder heads for the 221-cu in. engine. These truly precision cores aid in producing the light weight heads such as the one shown at the top.**

of great accuracy both in shape and in dimensions. And, in the process, it eliminates excess metal due to foundry variations, thereby holding to the minimum the amount of metal removed in the form of chips.

Perhaps the most significant feature of the whole scheme is contained in the statement that it is now perfectly practical and economical to make castings right to an engineering drawing and hold the critical elements to relatively close tolerances.

Now let us take a look at how this is accomplished. Apart from many improvements in foundry practice, melting practice, and cupola advancements, there are several principal features related to the making of light weight castings. First of all, the foundry specialists decided that cores must be radically improved; they must be precision-made; they must be dimensionally stable; yet the process must be more economical.

To accomplish these objectives, they drew on many years of experi-

ence with shell molding and its associated use of resin-bonded dry sand material. They also drew on their knowledge of die making for the die-casting and permanent-mold casting of light materials.

#### **Resin-Bonded Cores**

Based on such experience, the Engine and Foundry management decided to discard the conventional method of making dry sand cores with its time-consuming cycle of drying in ovens. All of the cores for the new foundry technique are resin-bonded, using the so-called "hot box" method of core molding and curing. The term "hot box" is used at the moment for want of a better descriptive name. This is accomplished by means of suitable metal core boxes which are made in a number of separate pieces, depending upon the intricacy of the core. As illustrated in several examples, the metal core boxes become a part of the core making machine in much the same relation-

ship as a large press die bears to the press.

The resin-bonded sand mixture is blown into the metal core boxes. Then it is cured in something less than a minute while retained in the "hot box." Curing is effected by keeping the molds heated, by means of gas jets, at a temperature around 475 F. It may be noted at this point that gas heating is the currently accepted method for new engine components, although the core boxes for the small Sixes are still being successfully heated electrically.

The rapid and automatic machine cycle produces precision cores which require no further drying, except for drying of sprayed-on protective coatings on certain cores, and can be handled immediately after removing from the core box.

It may be noted that massive cores, such as those for cylinder bores as an example, are cored to a hollow formation to promote thorough curing of thick sections.

*(Continued on next page)*



ABOVE—Final inspection prior to closing the mold for a 221-cu-in. V8 engine block. Visible in the lower half of the mold are the precise cores which, together with the increased and more uniform hardness of the surrounding



sand mold, produce a high degree of accuracy in the block.

ABOVE—Metal fingers withdraw cylinder barrel cores for the new 221-cu-in. V8 engine from the heated molds.

While this is the primary objective, the net result is less resin and core sand consumption, lighter weight cores to handle and assemble.

### Denser, Harder Molds

Having gone this far, the foundry research group undertook the next phase of the project. They reasoned that even though the cores were now of precision quality, this alone would not guarantee precision castings unless something was done to improve the method of making the mold itself. From the standpoint of overall economy, it was agreed that they would stay with green sand molding. On the other hand, both the molding machines and process would have to be changed in order to produce denser and harder molds, capable of holding the gamut of cores in precise location without shifting.

Since there was no time for designing, building and installing entirely new molding machines at the Cleveland foundry, the existing equipment was suitably revised to permit an increase in squeeze pressures ranging from 10 to 15 per cent, depending upon the operation. This change has been sufficient to produce a range of mold hardness

conducive to making vastly improved castings.

Let us return for a moment to the resin-bonded core sand. When the decision was made to use the new procedures for the small six-cylinder engine parts, the most readily available material was the same relatively slow curing phenolic resin that is used in making shell molds. This is still being employed for this purpose.

However, by the time the process group started working on parts for the 221-cu in. V-8, they had available a choice of urea-formaldehyde type resins. These resins, as well as faster curing phenolics, do a satisfactory job and they are much less expensive than the older phenolics. And this is an important factor in an enormous foundry operation.

### New Type Cupolas

Of course, these major changes in practice by themselves are not enough to do the job adequately. It became necessary to improve sand handling methods; to provide still better metallurgical control of the melt; and to have closer control of metal pouring temperatures at the mold.

This led to a major rehabilitation of the foundry in Cleveland. Within a short space of time all of the cupolas will be entirely replaced by equipment of advanced type having high reliability, providing better control of the metal and pouring temperature. The new cupolas, some of which are already in operation, are of water-cooled design, with graphite lining in the lower section where the molten metal is held, and are equipped with an individual, direct-fired air blast which preheaters feed to the cupola at 1000 degrees F. This hot blast removes the risk of insufficient heat at starting or during intervals between melts.

Net results of switching to the new type of cupola is a more efficient use of available raw materials; improved metallurgical control; more uniformity in pouring temperature; and increased productivity from each unit.

Finally, it is noteworthy that the foundry organization is doing a lot of work in the study of higher strength cast irons, preparing for the time in the near future when some of the bulkier sections can be made lighter while still capable of withstanding the stress loading of higher duty engines. ■

By  
Charles A.  
Weinert  
EASTERN EDITOR

# Machine Tool Builders Report Improvements in Business Situation

**A**T THE close of the 3rd Quarter, a representative group of machine tool builders reported moderate gains in order backlogs and inquiry activity, while at the same time predicting that incoming new business in the six months October 1 through March '62 would increase.

All of these factors have changed for the better in the short period of only three months since AI's last similar report on this subject.

The machine tool builders' reports also show that additional price rises are under way.

Further, that deliveries on orders placed in the 1st Quarter of 1962 may be extended—in at least some instances—over the deliveries now being quoted.

These impressions are obtained from consolidating and averaging out all of the responses to our latest periodic survey questionnaire. On the other hand, they do not necessarily apply to any one company—the situations continue to vary considerably between individual companies.

The details and conclusions presented in the following are based on 34 special reports to AUTOMOTIVE INDUSTRIES from leading suppliers of machine tools. These reports were cooperatively supplied in response to our latest quarterly survey questionnaire. The results of similar surveys covering preceding periods were published this year in AI issues of February 1, May 1, and August 1.

## ORDER BACKLOGS

The questionnaire sent the machine tool executives first asked each of them to indicate how their company's unfilled orders on hand as of October 1 stacked up against the volume at July 1.

Order backlogs of "about the same" volume were reported by 15 (of the 34) companies.

## Latest AI SURVEY Indicates—

- **Gains in Order Backlogs**
- **Increased Inquiry Activity**
- **More Business Next 6 Months**
- **Additional Price Increases**

Larger backlogs—ranging from 10 to as high as 60 per cent—were listed by 14 companies. The overall average for this group is +28 per cent.

One of the builders, with a rise of 31 per cent, commented, "Domestic business confined almost entirely to numerically - controlled machines." Another builder, naming an increase of 20 per cent, said, "Business steadily improving last three months, especially for large special (non-standard) presses."

Smaller order backlogs—with a range from 3.3 to 11 per cent—were reported by five companies. For this group the average is -5.9 per cent. One builder (5 per cent down) said, "No domestic pick-up."

For all of the 34 companies reporting, the average figure is +10.6 per cent. This figure—insofar as the particular companies participating in the present survey are concerned—would seem to show that business has picked up moderately in the 3rd Quarter, especially during the month of September.

Although all of the same identical companies did not participate in our previous two quarterly surveys, the order backlog averages at April 1 and July 1, versus January 1, were +1.8 and +4 per cent.

## AUTOMOTIVE ORDERS

The second question was, "Percentagewise, how much of your total orders on hand as of October 1 is represented by orders from automotive companies?"

As in the past, the big majority

(29 companies) report automotive orders on hand. Some of the builders' orders have a very high automotive representation—in one case 95 per cent, in three cases 80 per cent, and in three others 75 per cent. There are likewise some low portions of 1 per cent, 2 per cent, and "not many, but improved since last report."

The builder with one of the 80 per cent portions commented, "75 per cent foreign." Similarly, a builder showing a 48 per cent automotive order portion indicated that about 44 per cent of these orders were foreign; and that about 63 per cent of all his unfilled orders were foreign. A third builder, naming a 15 to 20 per cent automotive portion, said, "Hard to estimate because many firms produce metal parts for automotive industries."

For the 29 companies which have automotive orders on hand, the automotive portion for the group is 41.4 per cent of total orders on hand. In the last survey, based on the situation at July 1, the equivalent figure was 36.2 per cent average for 25 companies.

## INQUIRY ACTIVITY

As in the case of order backlogs, the relationship between inquiry activity at October 1 and that at July 1 was requested.

Inquiry activity at the "same" level was reported by 18 (of the 34) companies.

More inquiry activity was indicated by 14 companies. The "low" is 5 per cent; while the "high" is

100 per cent. In addition to the latter, there are other increases of 50 and 40 per cent.

One of the builders, with a 10 per cent increase in inquiry activity, said, "Mostly Ordnance projects." Another, with a 20 per cent increase, similarly reported, "Increase in Government activity accounts for most of the gain."

The average "up" for the 14 companies listing increases in inquiry activity is +23.2 per cent.

Less inquiry activity was reported by two companies, with "downs" of 35 and 12.1 per cent, respectively.

Taking the group of 34 companies as a whole, the average shows more inquiry activity, October 1 versus July 1, to the extent of +8.2 per cent. In the two previous quarterly reports the comparable figures were +3.2 per cent and +1.1 per cent.

#### BUSINESS OUTLOOK

Questioning as to the outlook for order receipts in the next six months from October 1 gave the following results:

The "same" volume (no change upward nor downward) was predicted by 11 companies. One of these, however, stated, "Our business has been good."

One company answered with a question mark.

An increase in business was forecast by 18 companies. The individual "ups" range from 5 to as much as 30 per cent; and the group average is +17 per cent.

One of two builders predicting increases of 30 per cent, remarked, "Ordnance." A builder giving a predicted rise in business of 10 per cent said, "Berlin situation could quickly affect machine tool order placing." Another, with a prediction of +25 per cent, said, "We will not notice a great upswing in orders during the next three months, but expect the first three months of 1962 to be excellent as far as cutting tools are concerned."

Besides the 18 companies giving percentage figures, one company checked off the "up"—making a total of 19 in the uptrend category.

Downward predictions were made by three of the officials. One of these respondents said, "I would

say order receipts would be down, but I don't know how much." The other two showed "downs" of 10 and 20 per cent, respectively. The builder making the -20 per cent prediction commented, "Our long delivery is beginning to have an adverse effect."

By averaging out the overall group of 31 companies giving numerical percentages, the outlook for new business in the next six months through March '62 displays an expected rise of 8.9 per cent.

#### AUTOMOTIVE PROSPECT

Query as to whether any sizable automotive business was in sight resulted in this response:

Among the 33 replies, 10 said "yes," and 23 said "no."

Some of the comments on this question were:

"Two large programs."

"Yes, normal—nothing exceptional."

"Have quotes for sizable business—don't know the chances of getting it."

"Looks like '63 models will require some new presses."

"Yes—about same ratio."

"Large programs in broaching equipment will be coming from Europe, South America, and perhaps Japan."

#### EQUIPMENT DELIVERIES

Those addressed were asked, "Do you anticipate the delivery time on orders placed during the 1st Quarter '62 will run longer than that now being quoted?"

"No change" was anticipated by 17 companies. One of these qualified his "no" answer by stating, "No change on standard presses—may run a bit more as customers purchase specials which require engineering."

Longer deliveries were foreseen by 11 of the builders. Most are on the order of 2 to 4 weeks longer. One builder, however, showed 20 weeks longer; and another anywhere from 0 to 12 weeks longer. In addition to the 11 giving specific times, one builder said, "As backlog continues to grow, deliveries could become longer." Comments:

"Yes, 20 weeks longer—due to heavy Ordnance buying of special machines."

"Two weeks (?) longer—difficult to predict this far ahead."

"Four weeks longer—current deliveries approximately 6 to 7 months."

"From 0 to 12 weeks longer—depends entirely on machine type. Deliveries extending rapidly on certain machines."

One of the builders simply answered with a question mark.

Shorter deliveries were anticipated by four companies. Only one of these gave a figure—four weeks. Various comments on this sector were:

"On the basis of what is known now, delivery time should be somewhat shorter."

"Four weeks shorter—now 31 weeks."

"We are quoting 12 to 14 months' delivery, and are shipping at a faster rate than orders."

"Shorter—if placed early in the first quarter."

#### PRICES OF MACHINES

As before, we asked the builders, "Do you expect to increase, in the near future, the prices of your machine tools—and if so, what is the percentage increase and when will it become effective?"

Inasmuch as several price rises have previously been placed into effect, it should again be kept in mind that a "no" answer this time may have been the result of a prior price change.

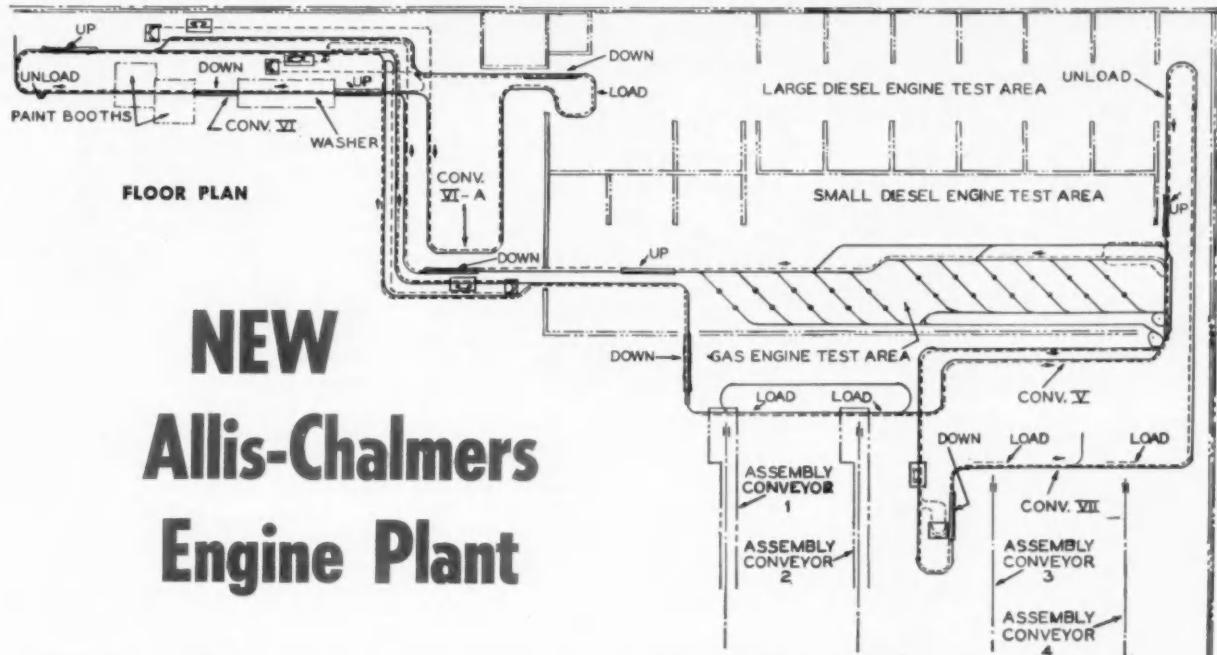
The replies saying "no" total 25. One builder comments, "No change, unless the Labor Dept. imposes higher wages on the machine tool industry under the obsolete Walsh-Healey Act." Another says, "We made selective increases effective Sept. 1, 1961, aggregating 5 per cent." A third says, "No change—we hope to reduce some prices due to cost-reducing engineering and manufacturing changes."

The companies now reporting new price increases total 8.

One of the price rises is from 3 to 5 per cent "on some models"—no effective date given.

There is another 3 to 5 per cent rise, effective in October or November.

Four companies show price increases of 5 per cent apiece—effective (Turn to page 91, please)



## NEW Allis-Chalmers Engine Plant

Features of Allis-Chalmers new engine plant near Harvey, Ill., were described by Joseph Geschelin in Part I, AUTOMOTIVE INDUSTRIES, September 15, 1961, page 65. The second part of this study covers cylinder block machining, engine assembly, and testing.

Engine building operations, now concentrated in the new plant, include nine basic Diesel and gasoline engines, and six other models used in the Company's line of material-handling trucks. Gasoline engines produced at West Allis still are built there.

Some of the important management decisions made long before the new plant was started were discussed in Part I of this study. Here we shall touch on the decisions leading to the introduction of two new lines of equipment for machining cylinder blocks. Briefly, this involved the handling of seven basic blocks—two for small engines, five for the large models. For competitive reasons it was essential to create a setup approximating mass production methods to the maximum extent. This would be the only way to assure the lowest possible cost levels consistent with optimum quality.

Yet the solution is not as clear cut as it is in building passenger car engines. Here the key is maximum flexibility of method and

equipment to accommodate the variety of parts that must be machined. The objective is a coupling of advanced methods with the requirements of batch type production.

When machine tool builders were approached on this project they recognized the complexity of the problem. Cooperative action eventually produced the two machine lines now in full operation. In appearance the block lines look very much like the transfer lines in a passenger car engine plant. Closer inspection shows them to be composed of a large number of individual, multi-spindle machines with fully automatic cycles when actuated by the operator. They are connected by sections of gravity roller conveyor on which the work is

Floor plan showing engine assembly lines and the network of Jervis B. Webb power-and-free conveyors which serve to transport assembled engines from the lines. The conveyor complex transports engines to the test stands, to storage, to repair, and finally out to wash and paint.

## PART II

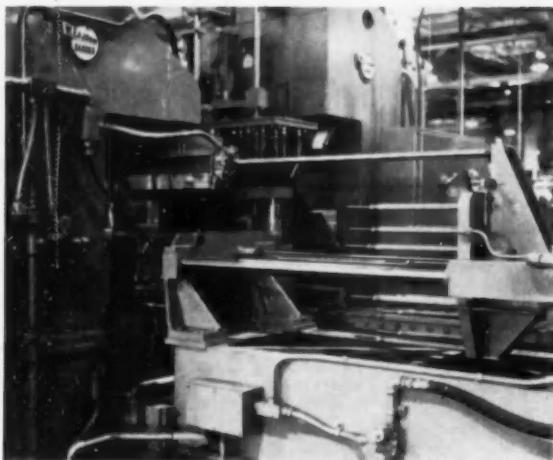
By Joseph Geschelin

DETROIT EDITOR

progressed manually by an operator.

Since efficiency and economy of operation depend upon a smooth, continuous flow, it was necessary to effect flexibility through machine design. To this end, each machine was studied intensively and it became possible ultimately to design machines with an arrangement of heads and spindle patterns that would encompass all of the hole patterns required for the variety of blocks. Since the spindle pattern takes care of the maximum number and spacing of holes for a given section of the block, all that is required in a changeover is to select the desired pattern and insert the proper tools.

We are told this scheme was developed so well that it requires only



#### MILLING

*One corner of the cylinder block department, showing several of the nine Kearney & Trecker milling machines that handle the preliminary operations on all cylinder blocks.*

#### PROBING

*The five-way W. F. & John Barnes machine which serves as the probing station ahead of Greenlee tapping operations.*

about one hour to effect the change-over from one block to another.

#### DRILLING AND TAPPING

*Perspective view of two cylinder block machine lines, connected by the K & T milling machine complex in the background. This shows the array of Greenlee way-type drilling and tapping machines installed on these lines.*

As one may surmise, the operation of the block line requires manual handling of blocks from one station to another, starting and stopping each machine. Several roller-over fixtures, supplied by Logan, are found along the line for tumbling to remove chips. These roller

over fixtures also are manually operated.

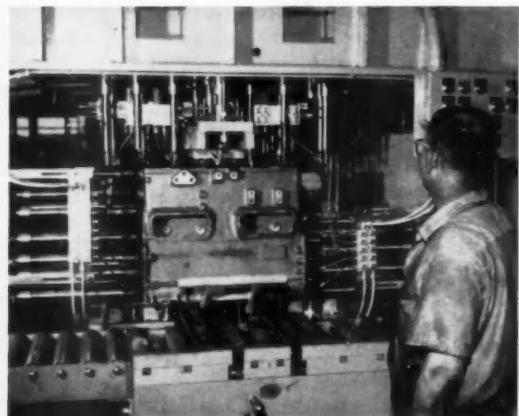
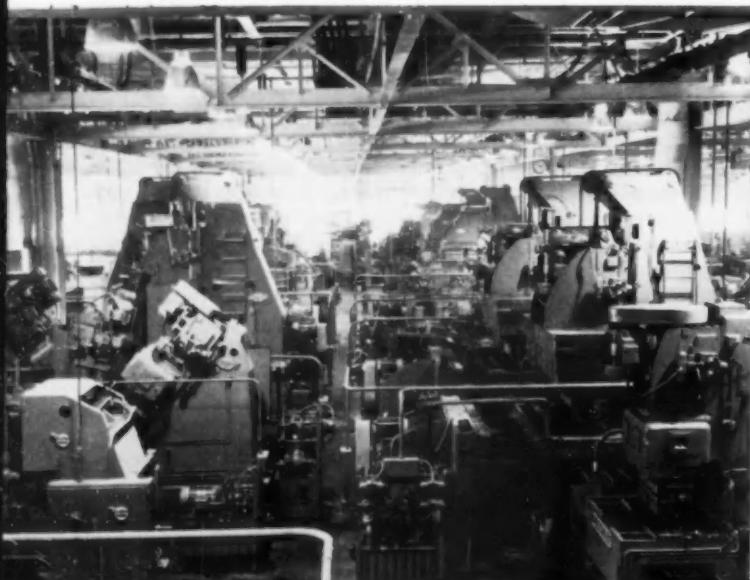
Besides the machine line, this article also will touch on the engine assembly lines, testing of gasoline and Diesel engines, and the impressive power-and-free conveyor system installed by Jervis B. Webb.

Since the two block lines are quite similar and utilize much the same makes of equipment, we shall concentrate on the line for machining the large blocks for Diesel engines. Because of comparatively low total volume requirements—about 180 engines per eight-hour day—it was found feasible to group the preliminary milling operations at the start of the line; and to use this one group for both machine lines. Consequently, the department is arranged roughly in U-shape with the two machine lines feeding from a common milling machine end.

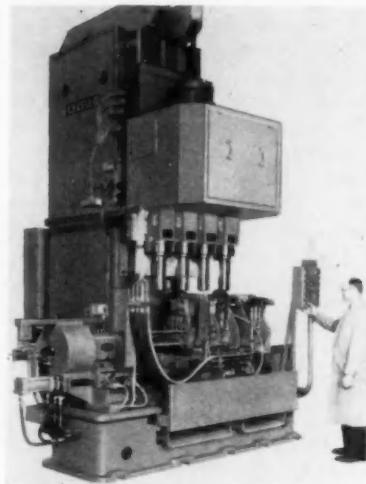
At this point there is a succession of six Kearney & Trecker milling machines for the following operations:

1. Rough-mill panrail and top deck; rough-mill bearing cap seats and sides.
2. Finish-mill panrail; drill and ream locating holes in panrail; finish-broach bearing cap seats and sides.
3. Straddle-mill bearing sides.
4. Rough-mill both ends.
5. Mill pads on both sides.
6. Rough- and finish-mill valve lifter bracket bosses.

Blocks now are shunted to the large block line at the right, starting with the rough-boring of cylinder

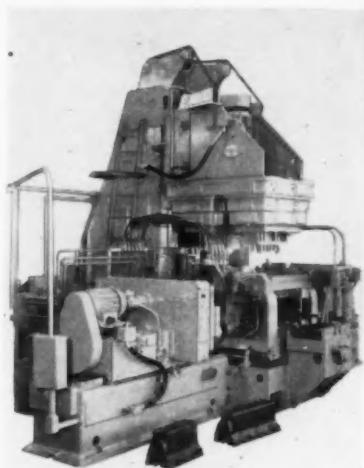


*Close-up of one of the Greenlee multi-way tapping machines on the cylinder block line.*



#### BORING MACHINE

The Custom Ex-Cell-O vertical cylinder boring machine, featuring a horizontal slide for finish-facing crankshaft thrust faces in the cylinder block. (View taken on the erection floor to provide an overall perspective.)



#### SHUTTLE MACHINE

Greenlee supplied 19 special semi-automatic, way-type drilling machines for the cylinder block lines. This view, taken on the erection floor at Greenlee, shows one of the three-way, horizontal and vertical shuttle machines.

der barrels and rough counterboring the bores in a large Ex-Cell-O vertical boring machine.

Blocks now progress through a series of nine Greenlee, multi-way, multi-spindle drilling machines. For the two lines Greenlee supplied 19 of these machines. The summary of operations for each of these machines is given below.

#### ASSEMBLY

Engines are assembled on pallet-type, flush conveyors fitted with pedestals and fixtures adjustable for three positions of the engine. This view shows a portion of one of the assembly lines.



#### No. 3 Greenlee

Vertical  
Drill 17 holes; ream two; comb. ream and drill two holes

65-deg Angular  
77-deg. Angular  
Drill two holes  
Comb. core drill one hole; counterbore; shuttle; comb. drill and chamfer two holes

#### No. 4 Greenlee

LH Horiz.  
Vertical  
Drill 22 holes  
Drill 27 holes; comb. drill and c'sink two

#### No. 5 Greenlee

LH Horiz. Sta. 1 Drill seven holes, redrill one; c'sink one; comb. drill and c'sink one  
Sta. 2 C'sink 20 holes

Vertical Sta. 1 Drill 20 holes  
Sta. 2 Drill 10 holes; c'sink two

#### No. 6 Greenlee

Vertical Sta. 1 Comb. ream and c'bore 14 holes; countersink two  
Sta. 2 Comb. ream and c'bore two; c'sink 24; ream two

RH Horiz. Sta. 1 Drill 19 holes; comb. drill and rough-c'bore six  
Sta. 2 C'sink eight holes; finish-c'bore four; comb. spotface and c'sink six bosses

#### No. 7 Greenlee

56-deg Ang. Sta. 1 Drill seven holes

77-deg. Ang. Sta. 1 Core drill

46-deg Ang. Sta. 1 Drill one hole

50-deg Ang. Sta. 2 Drill four holes

77-deg Ang. Sta. 2 Comb. drill and s'face one

#### No. 8 Greenlee

LH Horiz. Sta. 1 Tap seven holes

Sta. 2 Tap 23 holes

Vertical Sta. 1 Tap 26 holes  
Sta. 2 Tap 21 holes, one at 13-deg angle

RH Horiz. Sta. 1 Tap 18 holes  
Sta. 2 Tap five holes

#### No. 9 Greenlee

LH Horiz. Sta. 1 Tap 14 holes

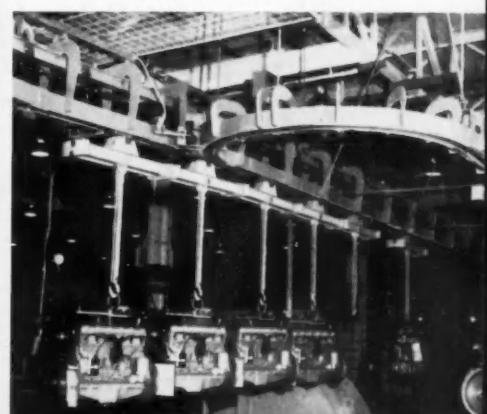
Sta. 2 Tap one

Vertical Sta. 1 Tap 11 holes

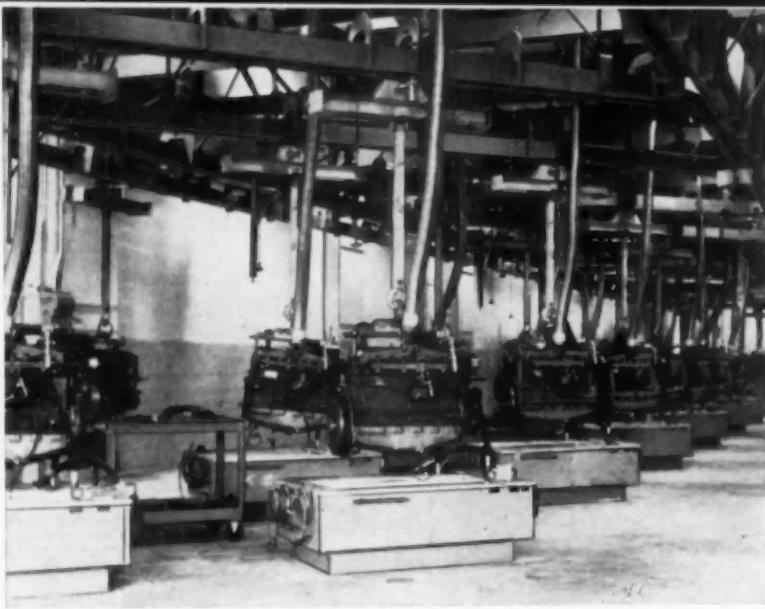
Sta. 2 Tap 26 holes

RH Horiz. Sta. 1 Tap 10 holes

Sta. 2 Tap two holes



In complexity of Jervis B. Webb conveyor system, engines are transported while suspended on special carriers.



Looking at the summary of operations in the two tapping machines immediately above, we find that the first one taps 100 holes, the other taps 59 holes, for a total of 159 tapped holes. Immediately preceding these two machines is a special five-way machine supplied by W. F. & John Barnes. It serves exclusively as an inspection device, equipped with hollow probes for checking all drilled holes for size and depth before tapping. It also contains an airblast mechanism which blows through each probe to clear chips.

Following tapping, the block from both lines are put through the first of two large Centri-Spray washing machines.

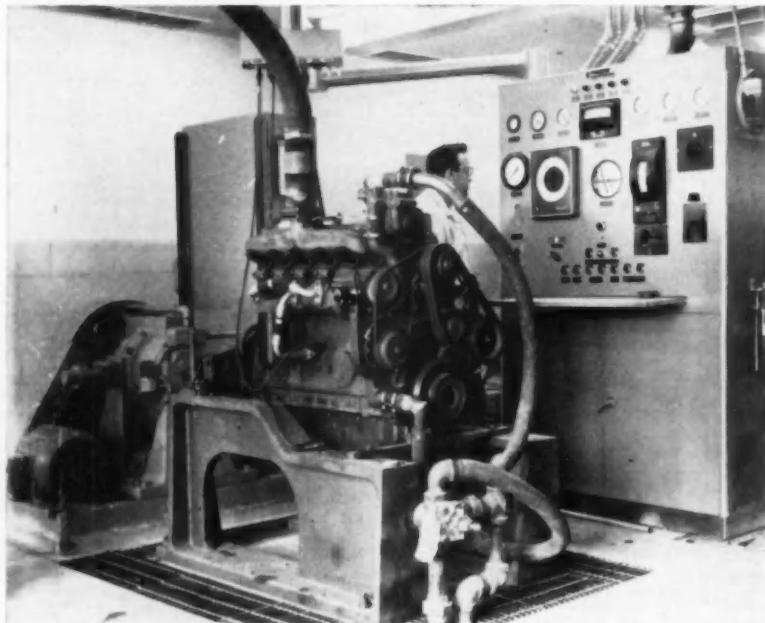
Next is the driving of studs and assembling of bearing caps, including installation of nuts, and tightening to desired torque with a Chicago Pneumatic multiple nut runner.

Blocks now proceed through two Ex-Cell-O special cam-and-crank boring machines. The first one handles the rough-boring of the cam and crank line, including dowel holes at both ends; the second machine does the semi-finish- and finish-boring of the same bores.

At this point the top deck is finish-milled in a K & T milling machine to correct this face now that all major machining steps have been completed.

Then the cylinder bores are finish-bore and counterbored, the

(Turn to page 78, please)



#### TOP—Testing Gasoline Engines

The smaller gasoline engines are hot tested on the special Control Engineering stands seen here. An interesting point is that the gasoline engines are tested while suspended on their carrier. This hot test has a duration of two hours.

#### MIDDLE—Testing Diesel Engines

Diesel engines all are tested on special dynamometer stands similar to the one shown in this view. Power absorption is by means of Dynamatic dynamometers. A distinctive feature of the A-C test stands is the special Honeywell instrumentation, housed in the console at the right.

#### BOTTOM—Spraying Accepted Engines

Engines that have been accepted after testing proceed through a steam wash and enter the large Binks spray booth for painting in specified color. Note that engines are transported on carriers on the Jervis B. Webb power-and-free conveyor system.





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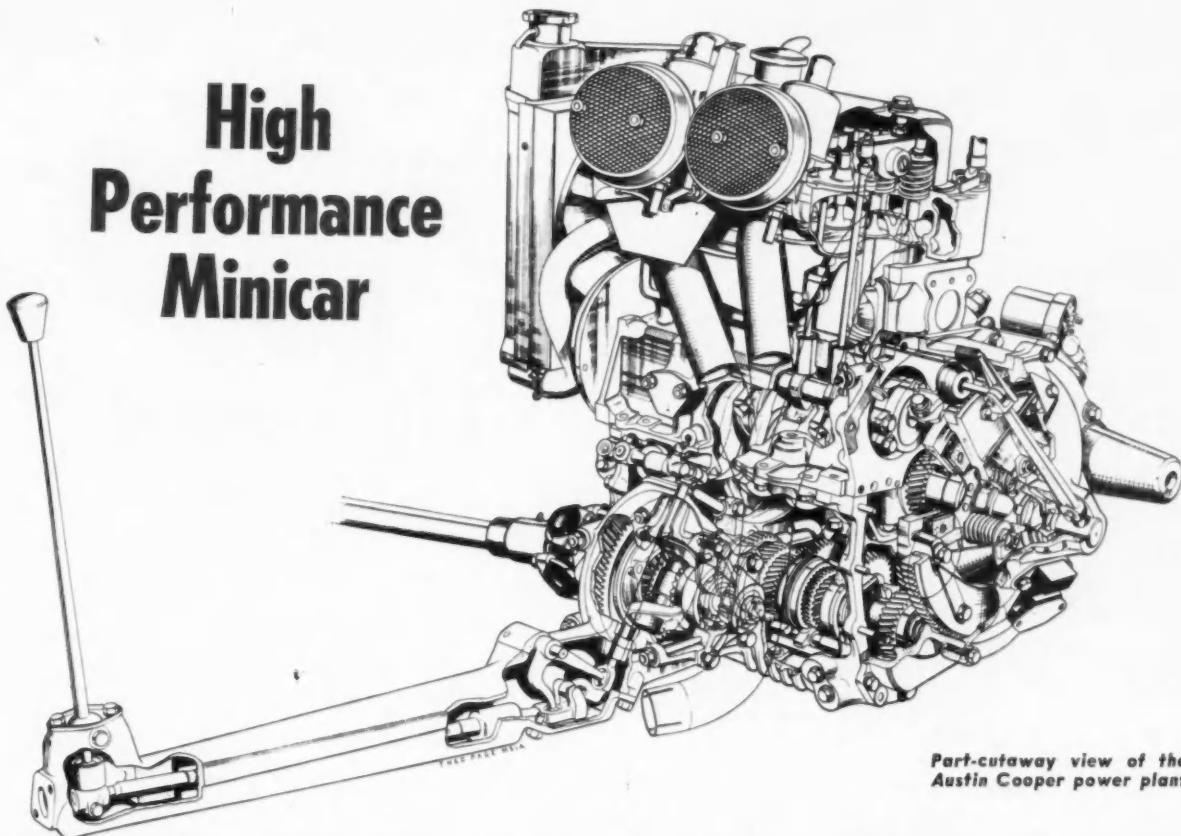
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# High Performance Minicar



Part-cutaway view of the Austin Cooper power plant

**M**ORRIS Mini-Cooper, a high-performance edition of the British Motor Corp.'s ADO

15 (Morris and Austin 850), has power upped to 55 hp from the standard 34 hp.

The engine's displacement is increased to 60.85 cu in. by a longer-stroke crankshaft, and it features twin S. U. carburetors, larger inlet valves, modified combustion chamber, a free-flow exhaust system, and double valve springs allowing engine speeds to 6000 rpm. Compression ratio is raised to 9 to 1.

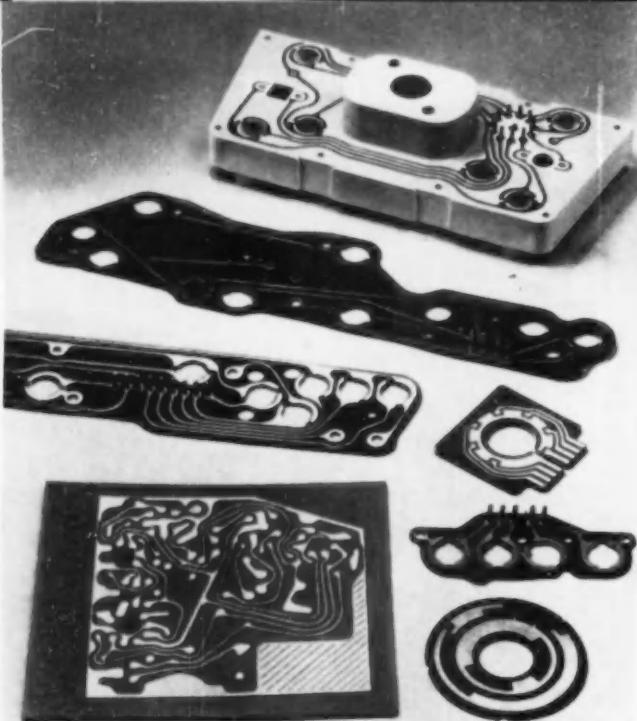
The transmission of the transversely-mounted front-drive power plant has a remote shift lever whose extension housing serves as an anchor point for the engine, replacing the former torque rod between the engine block and adjacent body panel.

Disk brakes on the front 10-in. wheels are 7-in. units specially developed by Lockheed, and are said to be the smallest ever fitted to a production car.

Other features include a 16-bladed cooling fan, fresh-air heater, sports-type bucket seats, and extended instrumentation. A similar model is marketed by Austin. ■



The new Morris Mini-Cooper car



These die stamped circuits are typical of a wide variety made by Dytronics, Inc. Circuits shown are used in automotive instrument panels, fuel gages, electrical instruments, and radios.

Die stamped circuits are comparative newcomers to the circuitry field. Because of this, the design of die stamped circuits is not as well known or understood as the design of older print-and-etch circuits. This article first reviews the general principles of good circuitry design which apply to both types and then points out some of the specific practices which should be observed in the design of die stamped circuits.

The method of manufacturing die stamped circuits has a decided influence on design considerations. They are made by die-cutting the conductor pattern from metal foil coated on one side with a thermo-responsive adhesive and simultaneously bonding the circuit to the insulating base material under heat and pressure. Use of long-wearing embossing dies permits production runs of approximately one million circuit boards without die change while maintaining tight tolerances on the circuit.

The possibility of long production runs is therefore the first consideration in designing a die-stamped printed circuit. Circuits produced by this means have provided savings of 10 to 40 per cent over comparable etched circuits. The principal manufacturing cost is that of making the die, hence the larger the quantity required of an identical board the greater the saving. In general, an order for 25,000 or more circuit boards can be produced at less cost by die stamping than by etching.

#### Standardization Desirable

By the same token, changes in the circuit pattern will either necessitate alterations in the die (if minor) or a new die (if major). For this reason, the design of the circuit board should be firmly established

# How to Design and Specify Die Stamped Circuits

By George J. Muller  
Manager-Technical Service; Dytronics Inc.  
Rochester, Mich.

before production orders are placed. This will assure the longest possible production run, with minimum dies cost and maximum savings in cost of the circuitry. So great are the possible savings that standardization of the circuit boards should be an important consideration in over-all product planning and in the design of other components assembled with the boards.

Where a certain amount of experimentation is necessary, or where short pilot runs are needed, the best course is to order print-and-etch circuits initially then specify die stamped circuits when the circuit pattern has been established. When this is done, however, the circuits for the prototype or pilot run stage should be designed with a view to ultimate production by the die stamped method.

Because they are produced mechanically, circuit configurations are uniform and can be maintained indefinitely. Thus, exact duplication is assured from unit to unit, regardless of how many circuits are produced from a given die. In designing the circuit, virtually no allowance need be made for variations in circuit pattern. This characteristic uniformity of die stamped circuits also saves inspection costs in the user's plant. Statistical control methods rather than 100 per cent inspection can be safely used.

#### Wide Choice Of Base Materials

The designer also has greater latitude in the choice of base materials. Since the circuits are produced by a dry process, with no excess metal to remove by chemical etching, degradation of the base material by chemicals or moisture need be considered only in relation to the environment of the end-product in

TABLE I

## STANDARD TOLERANCES FOR FABRICATING DIE STAMPED CIRCUITS

### Mechanical and Electrical Properties

See NEMA Standards pertaining to base materials. In special cases exceptions to the following tolerances may be made with factory approval. As methods and processes of the industry improve, data will be revised.

#### Smooth Saw

Plus or minus 0.010 in.

#### Hole Diameter (unplated)

- Drilled, plus or minus 0.002 in.
- Reamed, plus or minus 0.001 in.
- Punched (1/16-in.-thick paperbase).
  - Diam. to 1/4 in., plus or minus 0.003 in.
  - Diam. 1/4 to 3/8 in., plus or minus 0.003 in.
  - Diam. 3/8 to 1 in., plus or minus 0.004 in.
  - Diam. over 1 in., plus or minus 0.005 in.
  - Conform to above tolerances, with additional plus or minus 0.001 in., for base thicknesses of 3/32 through 1/8 in. Also for routed slots and notches up to 2 in.

#### Slots and Notches

Use tolerances shown above. Punched, considering both length and width as hole diameters.

#### Location Tolerances (dimensions between holes)

- Drilled by temporary drill jig, plus or minus 0.010 in.
- Drilled by jig bored hardened drill jigs, plus or minus 0.005 in.
- Punched by standard piercing die on dimensions up to 6 in., plus or minus 0.003 in. A high-precision die will reduce to closer tolerances. Additional plus or minus 0.001 in. for every inch over 6 in.

#### Hole-to-Circuit-Pattern Tolerances

- Drilled by temporary drill jig, within 0.020 in. of center.
- Drilled by permanent drill jig, within 0.005 in. of center.
- Punched by standard piercing die, within 0.010 in. of center. Additional plus or minus 0.002 in. for every inch over 6 in.

#### Front-to-Back-Pattern Tolerances

- Regular, within 0.015 in.
- Premium, within 0.005 in.

#### Circuit Pattern to Outside Dimension Tolerance

Blanked edges, plus or minus 0.010 in.

IMPORTANT: All registry tolerances are predicated on use of an accurate black and white master drawing made on dimensionally stable base. A negative of the circuit pattern may be supplied.

#### Overall Dimension Tolerances

- Sawed edges with jig, plus or minus 0.010 in.
- Blanked edges, plus or minus 0.003 in. Additional plus or minus 0.001 in. per inch of length.
- Sheared, plus or minus 1/32 in.

#### Holes (unplated) to Outside Dimension Tolerances

- Punched, plus or minus 0.010 in.
- Sawed by jig, plus or minus 0.010 in.

#### Line Width and Spacing Tolerances

- Without plating, plus or minus 0.010 in.
- Minimum line width and spacing:
  - Regular, 0.06 in.
  - Premium, 0.031 in.

#### Plating Tolerances

Guaranteed minimum thickness only.

#### Nicks, Pinholes and Scratches

Acceptable if they do not reduce line width by more than 33 percent.

#### Warp-Pattern One Side

- 1/16 in. base material: 0.015 in. max./in. of length.
- 3/32 in. base material: 0.010 in. max./in. of length.
- 3/8 in. base material: 0.006 in. max./in. of length.
- 1/4 in. base material: 0.003 in. max./in. of length.

#### Warp-Pattern Two Sides

All base material thicknesses 0.005 in./in. of length.

which the circuit board will be used, not to the method of producing the board.

At present, glass-base laminated plastics present some difficulties in the production of die stamped circuits due primarily to short die life. Any other type of laminate, and even such unique base materials as vulcanized fibre, thermosetting and thermoplastic molded materials, compressed paper and wood products may be used with facility.

The same pilot holes are used for piercing and blanking operations on the circuit board as for the die stamping cycle which produces the conductor pattern. This assures extremely accurate registration between the conductor pattern and all piercings. For this reason, tolerances can be specified as tight as 0.005 inch. Standard location tolerances are shown in the tolerance table appended.

Another important design advantage is the fact that thicker conductors (up to 0.015 inch thick) may be specified. Die stamped circuits may be designed to carry more than 40 amp, compared to a usual limit of 20 amp for etched circuits. Moreover, it is possible to specify a greater variety of conductor metals than heretofore. These include, in addition to the usual copper conductors, aluminum, brass, silver, gold, Nichrome, phosphor bronze, plated metals and steel alloys.

### Bond Strength

Die stamped circuits with a minimum bond strength of 10 lb per inch of width—as translated from 1/16 in. wide conductor—can be consistently supplied at standard cost. Higher bond strengths usually can be provided to meet specific requirements.

### General Design Practices

The same conductor patterns can be produced in die stamped circuits as in print-and-etched circuits, and what are considered good general design practices for the latter also apply here:

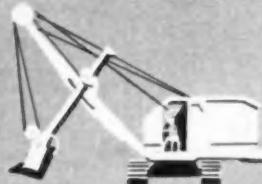
- Optimum arrangement of the circuit pattern to facilitate simplicity of design and replacement of components, hardware and wire leads.
- Use of penciled drawing in the initial stage of the design before committing the design to finished artwork.
- Design of land or boss area around lead holes to allow solder to flow toward hole when the board is dip soldered. This helps assure a fillet of solder around the lead.
- Elimination of large areas of solder to prevent the possibility of blistering or iceling during dip soldering. If areas larger than one-half square inch must be accommodated, cross hatch lines should be used or the area involved should be shielded with solder resist.
- Application of a safety factor to rated current carrying capacity for a specified width of conductor line.

(Turn to page 86, please)

# SCHWITZER PRODUCTS



*The Choice  
of the  
World's Foremost  
EQUIPMENT  
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for  
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- SHAFT SEALS
- FAN BLADES
- FAN DRIVES

- COUPLINGS
- WATER PUMPS
- AIR MOTORS

# News of the MACHINERY INDUSTRIES

By Charles A. Weinert

At 37th Annual Meeting of the American Machine Tool Distributors' Association, Machine Tool Users Tell the Suppliers What They Need for Making Cost-Saving Investments

## Distributors Discuss Better Service at Annual Meeting of AMTDA

WITH the theme "Customer-Oriented Selling," the excellent program for the 37th Annual Meeting of the American Machine Tool Distributors' Association was slanted toward up-grading the business relationships between the distributors and users of machine tools.

Many of the guest speakers were "customers" who expressed their recommendations on how the distributors, as a whole, might "do a better job." These thoughts were not presented as "complaints"—but rather as "suggestions" for better-serving the needs of the users. As a matter of fact, most of the "ideas" are not new—but by having them set out the distributors did receive first-hand a full picture of what the users presently need and want.

The program also included an impressive talk by Hickman Price, Jr.,

assistant secretary, U. S. Dept. of Commerce. Mr. Price reviewed the situation on world-market competition, and pointed to the utmost importance of taking aggressive steps to modernize American industrial facilities.

Ludlow King, executive vice-president of the National Machine Tool Builders' Association, discussed "Distributor-Builder Joint Programs." And John E. DeWolf, vice-president i/c market research, G. M. Basford Co., spoke on the subject of "How to Sell More Through Distributors."

Another important event was the nomination, election, and installation of new officers and executive committee members for the ensuing Association year.

Held last month in Pittsburgh, the business meeting had an attendance of about 240 Association members and guests. Representation

from the machine tool builders was unusually high, numbering some 60 executives.

### One User's Views

"Management Decisions for Capital Investment" was the title of a talk authored by Harry G. Beggs, vice-president, and presented in Mr. Beggs' absence overseas by Glenn W. Bailey of the International Telephone & Telegraph Corp. This talk outlined the steps taken by company personnel in making "sound investment decisions." Also how the machine tool supplier could assist company personnel in making such decisions.

In his opening remarks, Mr. Bailey noted that ITT is located in over 140 places throughout the world, has annual capital expenditures of more than \$100 million, and is largely a "manufacturing" company. Telephone and radio operating sales and revenue in 1960 amounted to less than 6 per cent of the totals.

Mr. Bailey further mentioned that since ITT's operations are



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President-Elect, AMTDA



C. DENISON DAY  
Vice-President



WILLIAM L. WALKER  
2nd Vice-President



ROBERT W. NISSEN  
Secretary-Treasurer

**an element here**  
**and an element here**  
**assures 99.98%**  
**filtration efficiency**  
**even when 1 element**  
**is out of operation**

**IT'S THE NEW PUROLATOR TWO-STAGE FILTER**

Simplicity of design makes the first cost of Purolator's new dry-type two-stage filter as low as any two-stage filter on the market. Each element filters independently, and together they dustproof your engine as no other filter can . . . 99.98% efficient.

Users save money and get better engine protection from this new Purolator filter, too. The first stage element will last up to 2000 hours, depending on operating conditions. The second stage will usually last almost indefinitely if the first element and sealing gaskets are maintained properly.

Another big user-advantage is the way the two-stage design protects the engine despite accidental mishandling of the element. Even if the first stage element is damaged, the chance of harming the engine can be discounted when it is protected with the second stage back stop element. In addition, the second stage element lets the operator service the unit in the field, regardless of how dusty the conditions are.



Both elements filter uniformly, in depth, over their whole surface, because they're both precision made of plastic impregnated cellulose. This series of two-stage filters is rated from 450 to 1150 cfm, with exceptionally low initial restriction. Mounting straps, rainhoods and outlet adapters are available.

For more information write to Purolator Products, Inc., Department 3896, Rahway, New Jersey.

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Please send me complete data on the new Purolator two-stage filter series.

Name  Title

Company

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*Filtration For Every Known Fluid*

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## I.T.T. INVESTMENT ANALYSIS

### Comparison of Alternatives for MAKING INSTEAD OF BUYING

	I Continue to Buy 100%	II Make 50% Used Machine	III Make 55% New Machine Simple Tooling	IV Make 75% New Machine Full Capability Tooling
<b>Hourly Requirements—Devices</b>				
Buy.....	100	50	45	25
Make.....	—	50	55	75
<b>TOTAL</b>	100	100	100	100
<b>Investment</b>				
Machine Tooling.....	\$ —	\$ 3,500	\$10,000	\$10,000
Installation.....	—	100	100	1,500
Working Capital.....	7,000	500	500	500
<b>TOTAL</b>	\$7,000	\$20,100	\$26,600	\$23,000
<b>Annual Operating Costs</b>				
Direct Labor.....	\$ —	\$10,000	\$10,000	\$10,000
Overhead.....	—	20,360	21,010	21,150
Material.....	85,000	53,000	51,000	39,000
<b>TOTAL</b>	\$85,000	\$83,360	\$82,010	\$70,150
<b>Differences—Compared with Alternative I</b>				
Added Investment.....	—	\$13,100	\$19,600	\$16,000
Operating Cost Savings.....	—	1,640	2,990	14,850
Savings after 50%.....	—	\$ 820	\$ 1,495	\$ 7,425
Return on Added Investment.....	—	6.3%	7.6%	46.5%

widespread, management at the operating level must be depended upon to make good investment decisions. These operating personnel, in turn, depend a lot upon the machine tool suppliers to help in making the proper selections.

For perhaps the same reason (widespread operations), the company has developed a simplified investment analysis formula. An example of the application of this formula, cited by Mr. Bailey, will be briefly described below and shown in the accompanying illustration.

The sample case is a make-or-buy decision. The considerations are (I) continue to purchase the part from vendors; (II) buy a used machine tool and make 50 per cent of the parts; (III) purchase a new machine with simple tooling and make 55 per cent of the parts; or (IV) purchase a new machine with tooling that provides full utilization of the machine, and make 75 per cent of the parts.

Most of the items in the analysis formula are self-explanatory. However, a few may need some explanation.

The item of "Working Capital" is primarily inventory of finished parts and/or of work in process. As will be noted, this item has a very large influence on the final decision.

With respect to "Material" costs, Mr. Bailey explained that these costs do not drop in direct relation to the shift from one alternative to the other because the raw material content remains fixed in all alternatives.

"Overhead" varies, he said, mainly because of the differences in depreciation charges resulting from the various investments in machines and tooling.

In this particular study, as will be seen in the compilation, Alternative IV—a new machine with full-capability tooling—is the most attractive.

Mr. Bailey expressed the belief that the machine tool suppliers, to be most effective in assisting user personnel, should provide the following services:

(1) Supply accurate production

rates on specific work to be performed in customer's plant. (Earlier he had stressed the importance of reliable cost and performance data.)

(2) Conversion of production rates into cost savings.

(3) Assistance in obtaining tooling of a special nature.

(4) Assistance in training supervisory, direct labor, and maintenance personnel in the operation of the equipment.

(5) Work with company personnel until equipment is producing at the established rate.

The speaker listed the following as additional factors where the machine tool distributor might contribute to the effectiveness of replacement programs:

(1) Make sure the plant's estimate of the proposed expenditure includes all cash requirements, such as installation costs, and accessories required to do the job.

(2) Assist in the preparation of estimates for changes in operating costs, such as on labor, material, and overhead—and don't forget start-up costs.

(3) Adjust approach to whatever form of investment analysis the plant is using.

(4) Quote on latest-model machine—it can get the business where an up-dated model of older design might not.

(5) Study all the machines involved in the process as a group—rather than limit the analysis to replacement of an individual machine.

(6) Don't oversell by proposing unneeded high precision or automatic features.

(7) Offer several machines, including "compacts" and not all "Cadillacs," because a "compact" might fill the customer's requirements and insure getting the order.

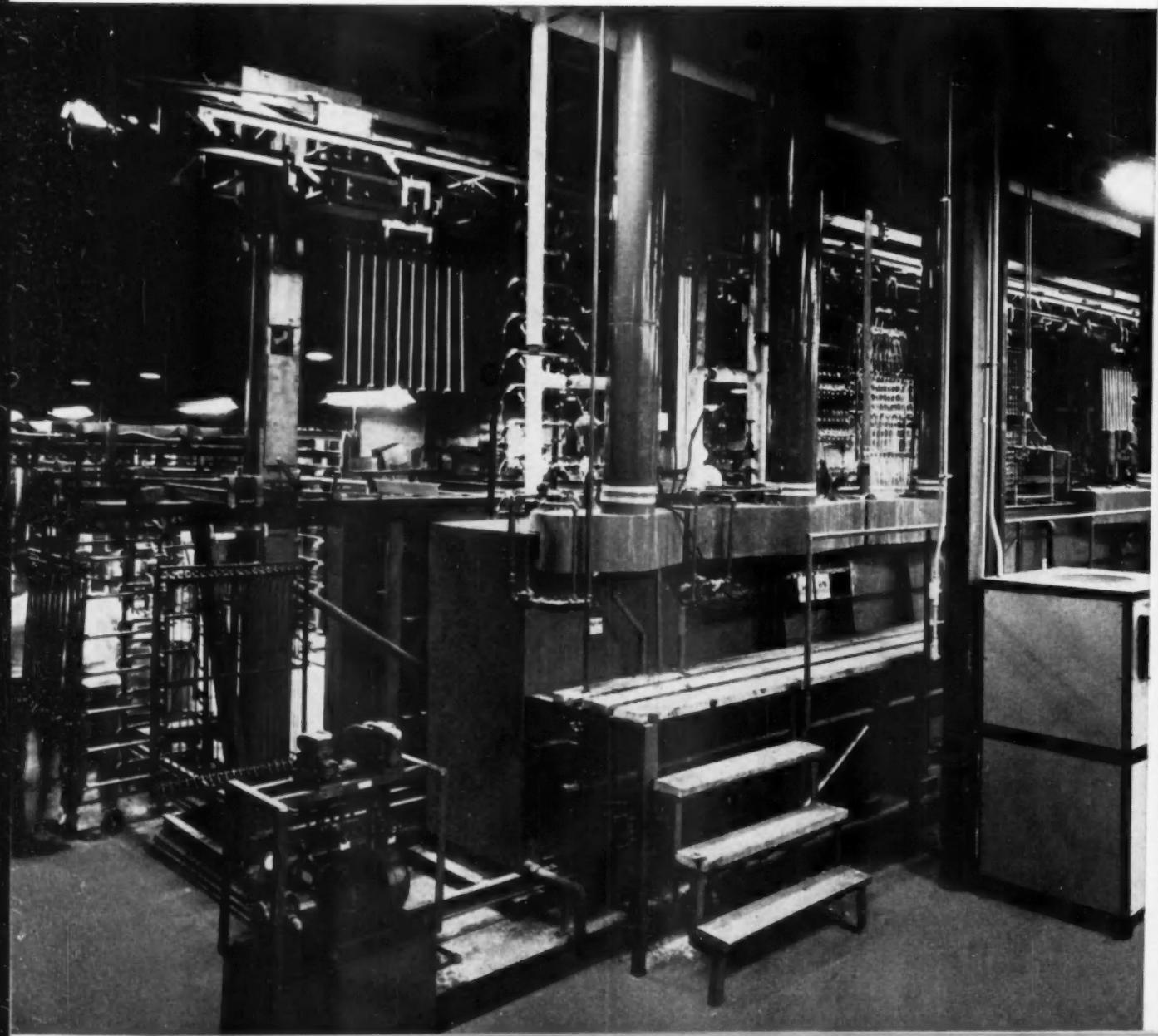
(8) Assist manufacturing personnel in presenting their appropriation request to the financial people within the plant.

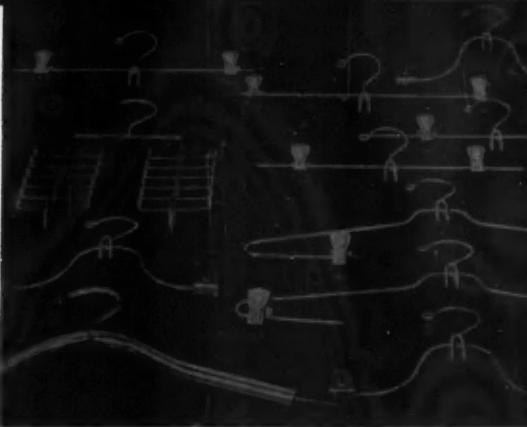
(9) Deliver the machine on schedule.

(10) Call back after the machine is in operation producing parts, and assist the manufacturing manager in making his post-completion report. This displays, to the customer, interest on the part of the distributor after a sale has been closed—and gives the distributor an opportunity to check out

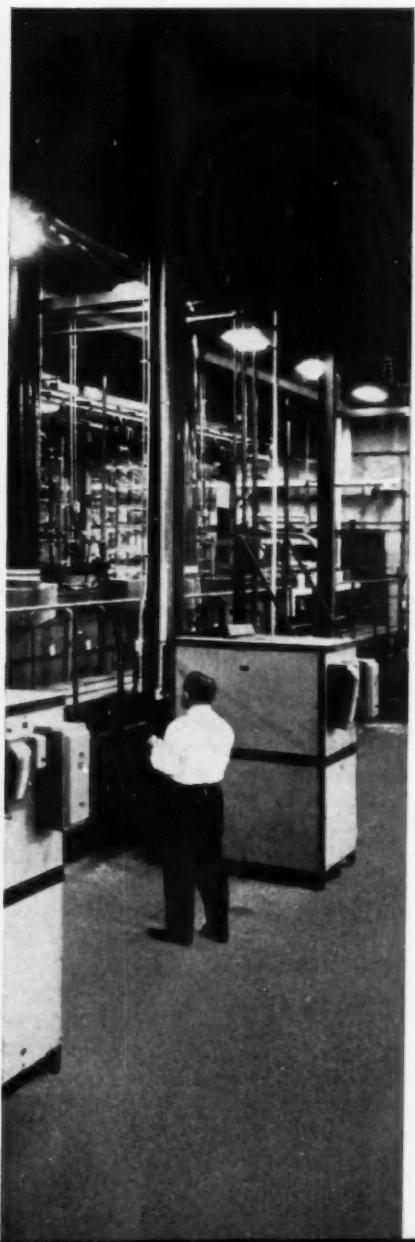
(Turn to page 89, please)

here's  
plating  
**quality** at





# its finest!



## **Udylite Full Automatic and the Incomparable "66" put more "sell" in accessories**

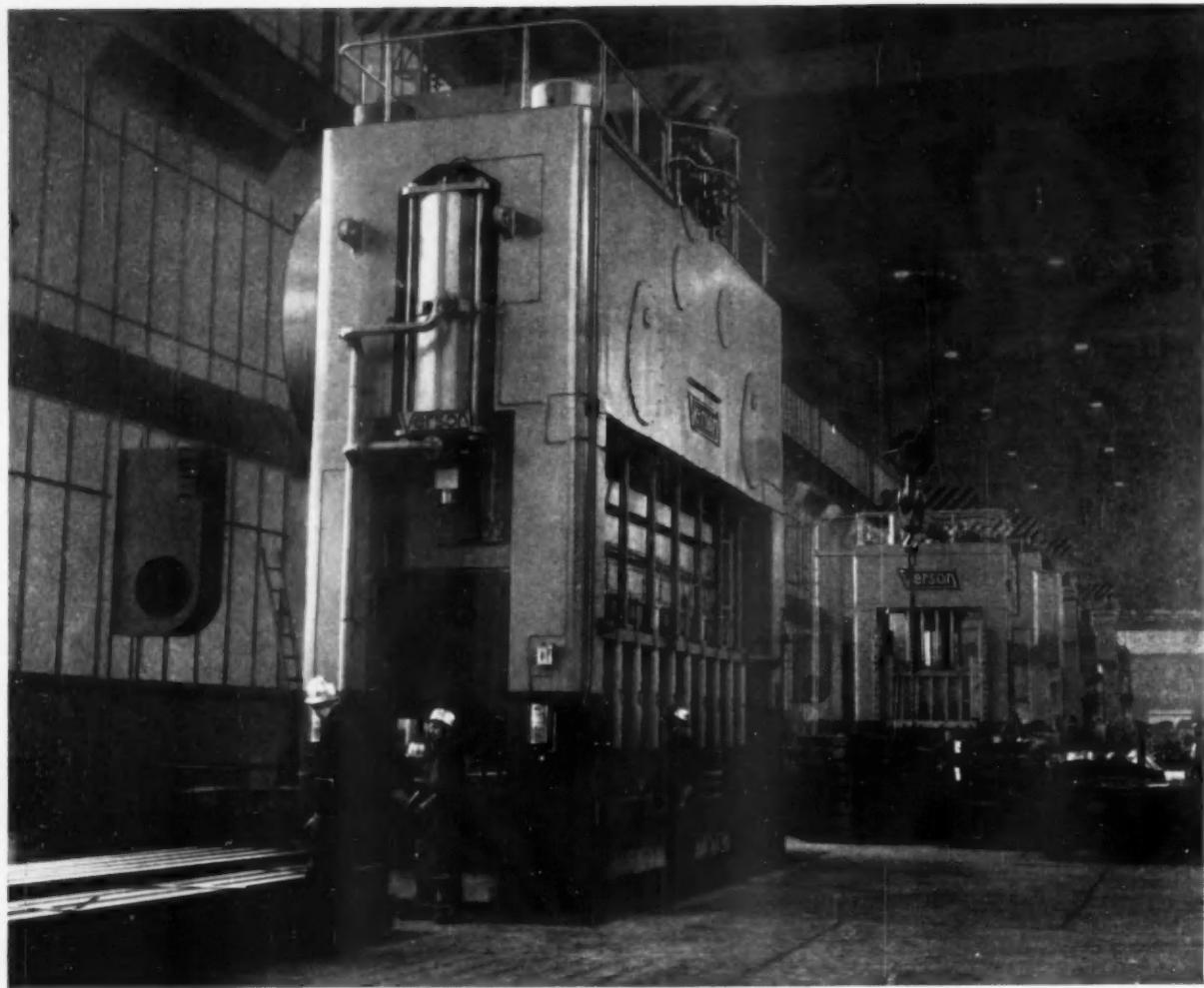
"Our Udylite Full Automatic is the nucleus of the largest plating plant in the notions industry," states Mr. E. Desmond Lee, President of the Lee-Rowan Company, St. Louis, Missouri. "It was selected because of our need for increased plating production and its built-in quality control." ■ The customer-stopping appearance of Lee-Rowan accessories and closet convenience items starts with the base nickel plating. The Udylite Incomparable "66" Process provides the bright finish and top leveling action required for lustrous chrome plating or jewelry finishing in 24K gold. The result is a line of metal accessories that have become top-selling impulse items in notion departments across the country. ■ The Udylite Full Automatic, in conjunction with the many superior Udylite Plating Processes, assures top finish quality at the lowest possible cost-per-unit. Ask your Udylite Representative how you can improve your product appearance, boost sales and step-up plating production. Udylite engineers will then recommend the right machine and the right process for your specific application.



**THE UDYLITE  
CORPORATION**  
DETROIT 11, MICHIGAN

The Udylite Full Automatic installed at Lee-Rowan is 83' 5" long, 11' 11" wide and has a ceiling height of 14' 4". Racks are 30" x 12" x 54".

Circle 129 on Inquiry Card for more data



## 2500 ton <sup>TON</sup>**Verson** <sup>TON</sup> Crank Press serves dual purpose for truck and bus builder

For many production requirements, the ability to make major equipment do more than one job can lead to important savings. That's just what a large manufacturer of automobiles, trucks and busses has done with the Verson press shown above.

The press is a big one. Capacity is 2500 tons. It's a double crank machine with front to back cranks. Area of the bolster between columns is 60" x 276". The press operates at eight strokes per minute with a twenty inch stroke. The slide is equipped with delayed action pneumatic knock outs, and the bed is equipped with pneumatic die cushions. Floor space required is 124" x 392". Height is 310". Weight exceeds 850,000 pounds.

As shown above the press is tooled to produce the truck and bus frame members shown at the left. When required, tooling can be changed to produce rear axle housings, a completed stack of which can be seen to the right of the press. Three sets of dies are installed for producing the rear axle housings to blank, draw and finish form.

If you're interested in getting the most out of press equipment, go over your requirements with your Verson Representative. He'll be glad to show you how you can take maximum advantage of Verson press building and press application capabilities. If you prefer, send an outline of your needs and we will make specific recommendations.



Originators and pioneers of allsteel stamping press construction

**VERSON ALLSTEEL PRESS CO.**

255

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MANUFACTURERS OF MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • IMPACT MACHINING PRESSES  
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# NEW PRODUCTION and PLANT EQUIPMENT

By C. J. Kelly

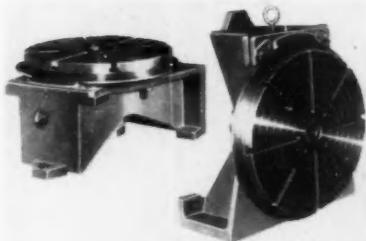
ASSISTANT EDITOR

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

## Rotary Angle Table

A WIDE variety of inspection, layout and machining operations can be performed with a new combination rotary table and angle plate. This device can be used either vertically or horizontally. It will rotate 360 deg with a radical accuracy, by vernier, to 5 minutes visual reading.

For convenient readings in either horizontal or vertical positions, grad-



ations are on a 45 deg angle. The overall table diameter is 18 in., and table flatness and runout are reported to be 0.0002.

Positioning rings and eight T-slots are provided to facilitate loading and clamping parts. A two point table lock assures positive locking. *Machine Products Corp.*

Circle 41 on Inquiry Card for more data

## Multi-Machine Monitor

UP to 40 machines can be monitored with a new desk-top size device that records the efficiency of utilization of the machines. Known as the Bar Chart Recorder, the unit operates remotely from production areas and provides cost and production control information on a continuous bar chart.

This device can also provide such information as operator number, job and shift number corresponding to any manual effort on the part of the operator.

Every 20 seconds the recorder samples and graphically records each machine's performance. If the machine is operating, the fact is recorded with a short horizontal line in the appropriate bar or channel area. Lines do

not appear if the machine is idle. Recorder is available with charting time of 9, 17 or 24 hours per chart.

Basic units of the recorder are a rotating drum, an inkless chart with 40 vertical bars or channels, and a stylus. The recorder is connected to the machine by telephone-type wires. *Electronic Associates, Inc.*

Circle 42 on Inquiry Card for more data

## Conveyor Line

FULLY portable and semi-portable conveyors have been developed in a new line to feed or discharge a wide variety of products.

The Series "A" Little Hustler conveyor is fully portable and features pitch adjustment of the charge and discharge ends to any angle from horizontal to a 45-degree incline. The Series "S" Little Hustler, is a semi-portable conveyor designed with telescopic legs for raising or lowering the discharge end.

Both Series "A" and "S" Little Hustler conveyors are available with neoprene-impregnated fabric belts for

general purpose use, or May-Fran Hinged-steel belting for handling hot or highly abrasive materials. *May-Fran Mfg. Co.*

Circle 43 on Inquiry Card for more data

## Electrolytic Machining Unit

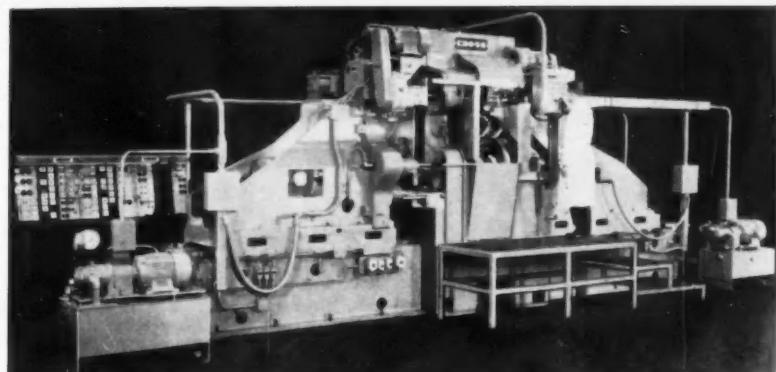
DISSOLVING up to 60 cu in. of metal per hour is reported to be possible with a 10,000 ampere power supply unit using the Anocutting principle of cavity sinking or grinding.

The power supply unit includes the patented Anocut electronic voltage computer, key to accurate control of metal removal. The computer automatically monitors and adjusts voltage, to maintain top removal speed without producing damaging sparks. At the same time it filters out unwanted voltage fluctuations, so that smooth finishes can be maintained.

This power supply unit is housed in a cabinet measuring 72 in. high, 120 in. wide and 50 in. deep. It contains over 4 tons of electrical components. *Anocut Engineering Co.*

Circle 44 on Inquiry Card for more data

## Trunnion Processes Workpieces of Different Materials

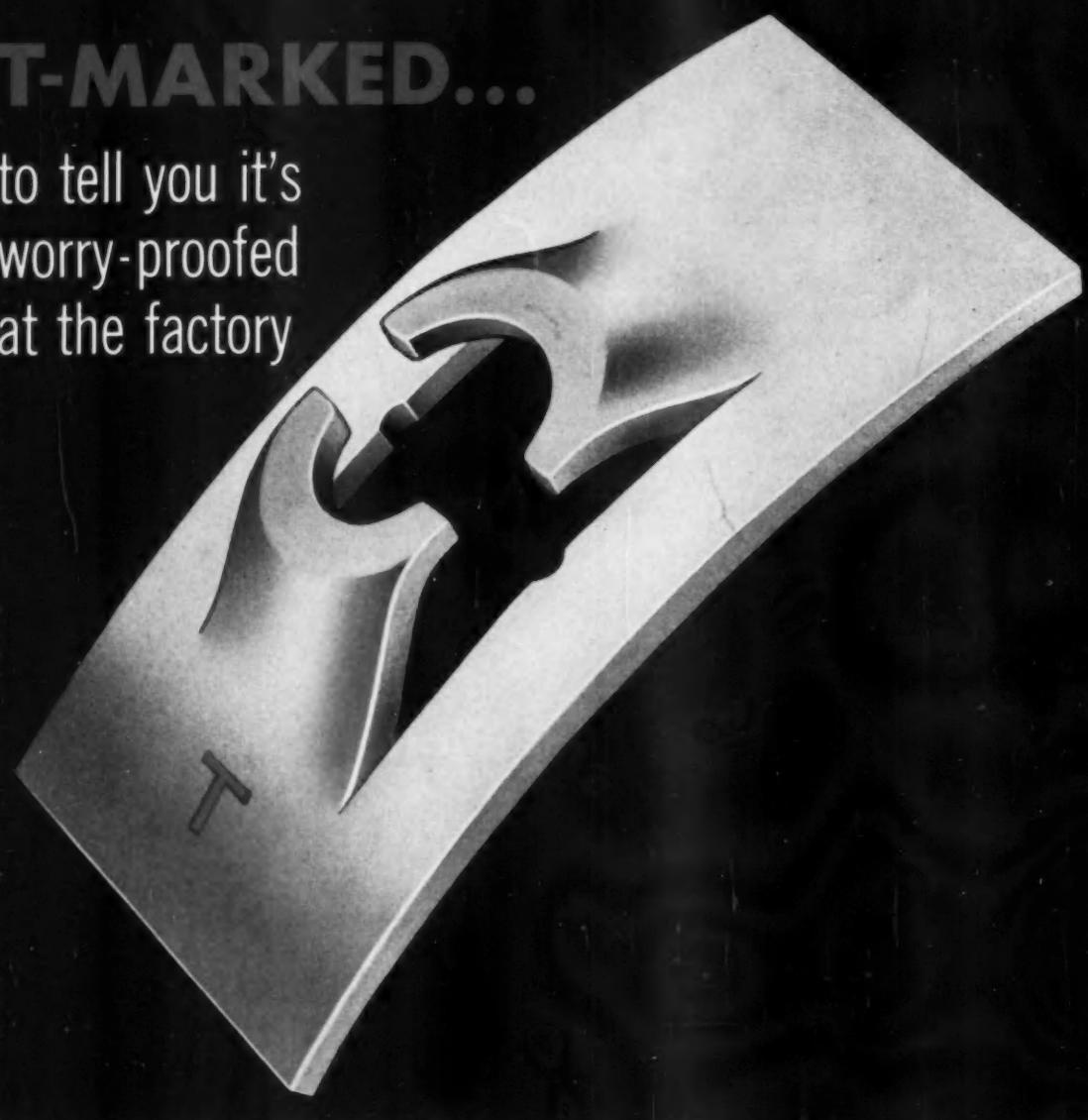


A typical application of this new-design trunnion is in the manufacture of remote-accessory cylinders for tractors. Cylinders, which differ in both size and material, are rough-, semi-finish, and finish-boring, and faced. Drilling, counterboring, chamfering, tapping and grooving operations are also done in this 10-station machine. Two main heads and four auxiliary heads carry all cutting tools. Similar operations, such as boring, drilling, counterboring and chamfering are performed by spindles carried in the main heads. Dissimilar operations, such as tapping and facing, are accomplished by auxiliary heads, which are related to the main heads in different ways. *The Cross Co.*

Circle 45 on Inquiry Card for more data

# T-MARKED...

to tell you it's  
worry-proofed  
at the factory



Other spring fasteners may look like Tinnerman SPEED NUTS. But only the *T-marked* ones really are SPEED NUTS... really are "Tinnermans"... made to highest quality and precision standards to assure worry-proof performance on your assembly.

Here's what the exclusive Tinnerman T-mark means to fastener users:

Over thirty-five years of Tinnerman experience as the originator and largest producer of spring-steel fasteners...the leader in solving your fastening problems,

Outstanding fastener design and production experi-

ence that assures you the best possible design of SPEED NUT, whether it is a special SPEED NUT or one of the 10,000 SPEED NUT brand fasteners presently available,

Stringent control of SPEED NUT quality from coil strip to you, including die design, production, heat treatment and finishing.

Be sure you specify "Tinnerman T-marked SPEED NUTS" that give you better fastening, that cut parts and assembly costs, that never let you or your customer down. *Tinnerman Products, Inc., Dept. 12, Box 6688, Cleveland 1, Ohio.*

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario.  
GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales.  
FRANCE: Simmonds S.A., 3 rue Salomon de Rothschild, Suresnes (Seine).  
GERMANY: Mecano Simmonds GMBH, Heidelberg.



# NEW PRODUCTION and PLANT EQUIPMENT

(Continued from page 67)

## New Whiteprinter

A NEW high speed table model dry diazo whiteprinter is now available. Called the Starlet 80, it is similar to the Starlet 60 whiteprinter introduced earlier by the same company. The new model features a stronger exposure lamp for higher printing speeds.

The lamp in the model 80 is an 80 watt/in. lamp that will enable the machine to operate at speeds as high as 55 lineal fpm. It will accept paper to 20 in. wide by any length. The developer section features a full strength ammonia system automatically fed by a solenoid pump. The unit operates on a nominal 220 V.

Overall dimensions of the whiteprinter are 28½ in. high and 40 in. wide. With the feeding leaf, the depth of the machine is 41½ in. *Paragon-Revolute Div., Charles Bruning Co., Inc.*

Circle 46 on Inquiry Card for more data

## Versatile Timer Control

PROTECTAL is the name given a new electronic timer which provides timed-on and timed-off intervals for actuating continuous process equipment and systems. The device has two adjustments for predetermined time intervals: on—from 1/16 to 5 seconds; off—from 1/16 to 30 seconds.

A step switch consecutively energizes up to 24 external circuits for a wide range of precise pulsing operations. The design incorporates a single life-tested electronic tube. The unit is equipped for 115 Volt 60 cycle operation. An open type chassis is available for panel mounting. *Protection Controls, Inc.*

Circle 47 on Inquiry Card for more data

## Strip Steel Separator

A NEW device has been designed to operate and guide strands of strip steel as they are wound on a recoiler after slitting.

The unit consists of a steel shaft supported to and above the recoiler head, and arranged to turn in anti-friction bearings. Six inch diameter hardened and ground steel separator disc are positioned on the shaft by micarta spacers in accordance with the width of strips being wound—slit strips passing between the discs.

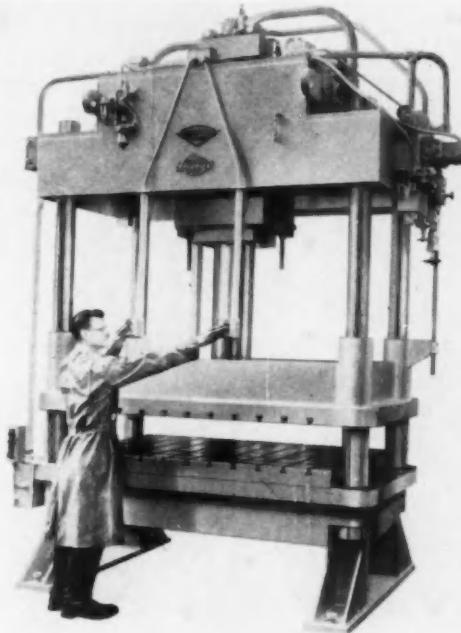
When the slitting run is completed, the shaft—packed with steel discs and micarta spacers—is raised by remote control, and the coils freed for handling. *Production Machinery Corp.*

Circle 48 on Inquiry Card for more data

## 100 Ton Hydraulic Trim Press for Production

An adjustable deceleration valve and capability of exerting 100 tons of trimming stroke pressure are features of a new 4-bar trim press. High speed production can be realized from the fast approach velocity produced by this unit. The machine has an approach of 900 ipm and a return speed of 875 ipm. Actual trimming action is 59 ipm for neatly sheared castings. Other features of the line include a 72 by 36 in. die area, a supporting 52 by 88 in. base platen, safety stops on the tie bars, and a 30 in. stroke. *B & T Machinery Co., A div. of Greenlee Bros. & Co.*

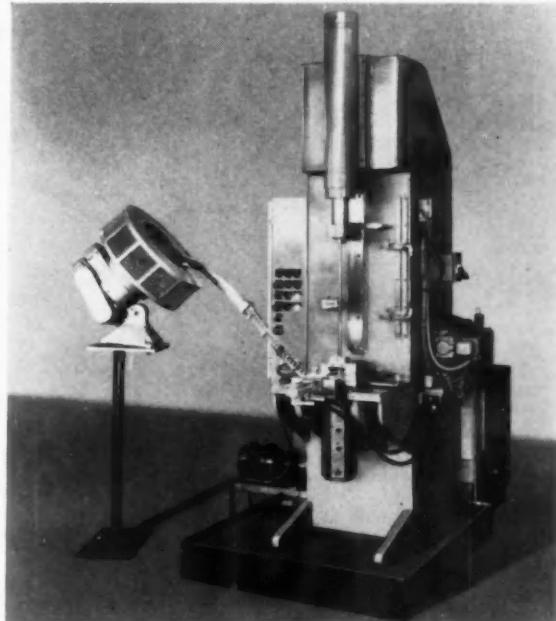
Circle 49 on Inquiry Card for more data



## Broaching Machine Produces 1000 Parts Per Hour

Spur gear production rates at one of the leading automotive parts makers plant is expected to increase sharply with the utilization of a recently developed line of broaching machines and tooling. According to the manufacturer the new units will produce gears at approximately 1000 parts per hour and one operator can handle several machines of this model.

Circle 50 on Inquiry Card for more data



SETUP for automated, high-production cycling, 1024 steel gear blanks are loaded, oriented and conveyed to the broaching fixture along a track from a rotating, gravity-fed hopper. An automatic slide feeds the blanks into broaching position. The parts are then pushed through a pot containing accurately ground and located broaching inserts. In one pass all nine gear teeth are cut, with stock removal amounting to 0.160 in.

tooth depth. Gravity unloading allows parts to fall directly into a parts handling container or a moving conveyor.

Concentricity of the gear bore with tooth pitch diameter is held to 0.003 in. tir. Broaching speed is 50 fpm down—100 fpm up, utilizing a 24-inch stroke. The entire machining cycle is hydraulically actuated and solenoid controlled. *General Broach and Engineering Co.*

Inter-State  
Motor Freight Lines

1950 ILL 35628 ITH 16-TC  
1950 ILL 2498 PSC 282A-2344A  
1950 2915 RX 1049, 1799, 2056  
1950 4091 ILL CC 401-MC-CR  
1952 HIS 03 217 KYU 11-611

1470



BRAKE HEADQUARTERS OF THE WORLD

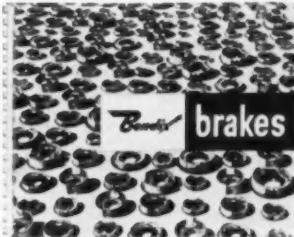


# WHATEVER THE VEHICLE BENDIX HAS A BRAKE TO STOP IT BETTER!

Regardless of size, shape, or power of the vehicle, Bendix makes a brake to stop it more safely, surely. Currently, we're producing over 400 different types of automotive brakes alone, so the answer to a specific brake problem probably is included in our line. If not, we will design and produce the brake that meets the exact need.

Bendix® brakes are quality-built—made to our high standards of reliability and long service. Forty years' experience and over 141,000,000 brakes sold are your assurance that you get quality when you specify Bendix. Bendix conducts more research and testing than any other brake manufacturer, both in the laboratory and in the field.

Got a brake problem? Let us help you analyze and solve it. Call, wire or write our Automotive Brake Department, Customer Applications Engineering, at South Bend.



#### FREE 82-PAGE BRAKE CATALOG

Shows brakes for almost every application. Gives complete axle load rating data. Details brake torque capacity ratings. Provides installation data. Discusses Duo-Servo® and non-servo hydraulic and mechanical brakes; Twinplex® and uni-servo hydraulic brakes; auxiliary mechanical brakes; new band/disc brake. Write for your free copy.

**BENDIX BUILDS MORE BRAKES FOR MORE  
DIFFERENT VEHICLES THAN ANY OTHER  
MANUFACTURER**

**Bendix Automotive Products Division**



Circle 132 on Inquiry Card for more data

# INDUSTRY STATISTICS

By Marcus Ainsworth, STATISTICAL EDITOR

## WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Makes	Weeks Ending		Year to Date	
	Oct. 14	Oct. 7	1961	1960
<b>PASSENGER CAR PRODUCTION</b>				
Total—American Motors	7,834	8,985	265,284	379,277
Chrysler	2,710	2,726	70,886	68,415
De Soto			17,941	
Dodge	4,902	5,259	113,699	318,383
Imperial	469	403	6,540	12,655
Lancer	1,799	1,916	38,624	32,004
Plymouth	5,832	5,951	136,180	204,889
Valiant	3,128	3,121	92,031	202,324
Total—Chrysler Corp.	18,840	19,376	457,760	856,611
Comet		1,098	138,885	154,866
Falcon		2,905	384,161	407,077
Ford		3,906	589,214	781,244
Lincoln		217	22,189	13,483
Mercury		771	78,234	123,127
Total—Ford Motor Co.		8,597	1,213,683	1,479,897
Buick	4,930	4,785	128,247	205,325
Buick-Special	2,442	2,461	62,998	10,427
Cadillac	3,792	3,379	107,341	122,371
Chevrolet	27,926	24,810	874,403	1,268,306
Chevy II	4,097	3,671	12,957	
Corvair	8,493	8,877	246,914	192,848
Oldsmobile	6,665	6,145	170,012	289,107
Oldsmobile F-85	1,647	1,748	48,407	12,757
Pontiac	6,790	5,925	164,103	344,706
Tempest	2,388	2,624	83,769	1,598
Total—General Motors Corp.	67,170	62,425	1,887,151	2,447,447
Total—Studebaker-Packard Corp.	2,481	2,414	50,678	86,351
Checker Motors	155	142	4,584	5,813
Total—Passenger Cars	96,480	102,239	3,889,120	5,255,306

## TRUCK AND BUS PRODUCTION

Chevrolet	7,496	7,448	249,817	316,154
G. M. C.	1,087	1,683	55,184	88,577
Diamond T	46	53	1,439	2,235
Divco		16	1,783	3,256
Dodge and Fargo	1,631	1,540	53,645	58,048
Ford		1,878	258,327	273,649
F. W. D.	17	16	705	750
International	2,719	3,053	112,548	101,827
Mack	202	242	8,063	12,263
Studebaker	124	125	5,804	10,510
White	412	353	13,299	13,123
Willys	1,690	1,761	90,876	104,127
Other Trucks	85	85	3,401	4,022
Total—Trucks	16,119	18,253	854,708	988,480
Total—Motor Vehicles	112,599	120,492	4,743,826	6,243,766

## 1961 NEW REGISTRATIONS\*

### NEW CARS

Make	August 1961		July 1961		August 1960		Eight Months	
	1961	1960	1961	1960	1961	1960	1961	1960
Chevrolet	121,360	138,163	140,595	1,049,285	1,175,554	1,175,554	Chevrolet	25,175
Ford	116,690	117,920	110,522	880,149	944,556	944,556	Ford	27,034
Rambler	32,973	32,920	37,482	241,167	296,005	296,005	International	11,908
Pontiac	24,887	29,895	30,654	235,439	271,515	271,515	G. M. C.	6,156
Oldsmobile	22,817	24,353	25,359	201,903	229,627	229,627	Dodge	3,660
Plymouth	27,318	26,344	34,486	202,853	312,367	312,367	Volkswagen	2,680
Buick	21,526	25,220	17,837	186,019	172,509	172,509	Willys Truck	1,257
Dodge	18,684	16,711	26,547	151,466	256,857	256,857	White	1,152
Comet	17,719	17,684	17,708	125,531	87,169	87,169	Willys Jeep	1,354
Cadillac	9,224	9,931	11,135	91,839	95,382	95,382	Mack	777
Mercury	9,644	10,540	9,822	79,483	102,574	102,574	Studebaker	332
Chrysler	7,000	7,439	5,629	59,600	52,791	52,791	Diamond T	163
Studebaker	3,801	4,738	8,426	45,431	76,276	76,276	Brockway	98
Lincoln	1,869	1,808	1,396	18,920	14,573	14,573	All Others	653
Imperial	671	750	1,039	6,889	10,463	10,463	Total—All Makes	81,999
Misc. Domestic	413	535	2,174	5,282	24,859	24,859	Total—All Makes	83,620
Foreign	35,070	33,895	42,577	260,265	356,827	356,827	Total—All Makes	81,440
Total—All Makes	470,646	501,046	525,400	3,851,521	4,483,104	4,483,104	Total—All Makes	600,441

## NEW FOREIGN CAR REGISTRATIONS\*

### AUGUST

	1961	1960	
Volkswagen	14,514	Volkswagen	11,762
Renault	4,838	Renault	4,869
Volvo	1,320	Opel	2,207
Triumph	1,241	Simca	2,014
Mercedes-Benz	1,146	Triumph	1,913
Fiat	989	Fiat	1,838
M. G.	943	English Ford	1,800
Austin-Healey	906	Austin-Healey	1,565
Metropolitan	890	Volvo	1,320
Simca	866	Mercedes-Benz	1,198
All Others	6,574	All Others	11,094
Total	34,227	Total	41,580

### EIGHT MONTHS

	1961	1960	
Volkswagen	117,673	Volkswagen	100,056
Renault	28,638	Renault	48,901
Fiat	8,484	Opel	20,026
Mercedes-Benz	8,043	English Ford	19,127
Triumph	7,542	Fiat	15,810
Volvo	7,342	Triumph	12,711
English Ford	7,318	Austin-Healey	12,192
Austin-Healey	6,311	Simca	11,739
Metropolitan	6,178	M. G.	9,879
M. G.	6,142	Mercedes-Benz	9,431
All Others	52,565	All Others	91,058
Total	256,236	Total	350,930

## TRACTOR SHIPMENTS

### WHEEL TYPE

Hp. Ratings	August	Eight Months
9-34 belt hp.	876	15,959
35-39 belt hp.	1,317	21,151
40-49 belt hp.	1,385	26,082
50-59 belt hp.	974	22,832
60 belt hp. and over	1,603	43,896
Total—Wheel Type	6,155 <sup>1</sup>	130,922 <sup>2</sup>

### TRACKLAYING TYPE

20-59 net engine hp.	200	5,261
60-129 net engine hp.	496	4,267
130 net engine hp. and over	670	4,739
Total—Track Type	1,366 <sup>3</sup>	14,267 <sup>4</sup>

<sup>1</sup>—Valued at \$15,511,000

<sup>2</sup>—Valued at \$21,288,000

<sup>3</sup>—Valued at \$323,507,000

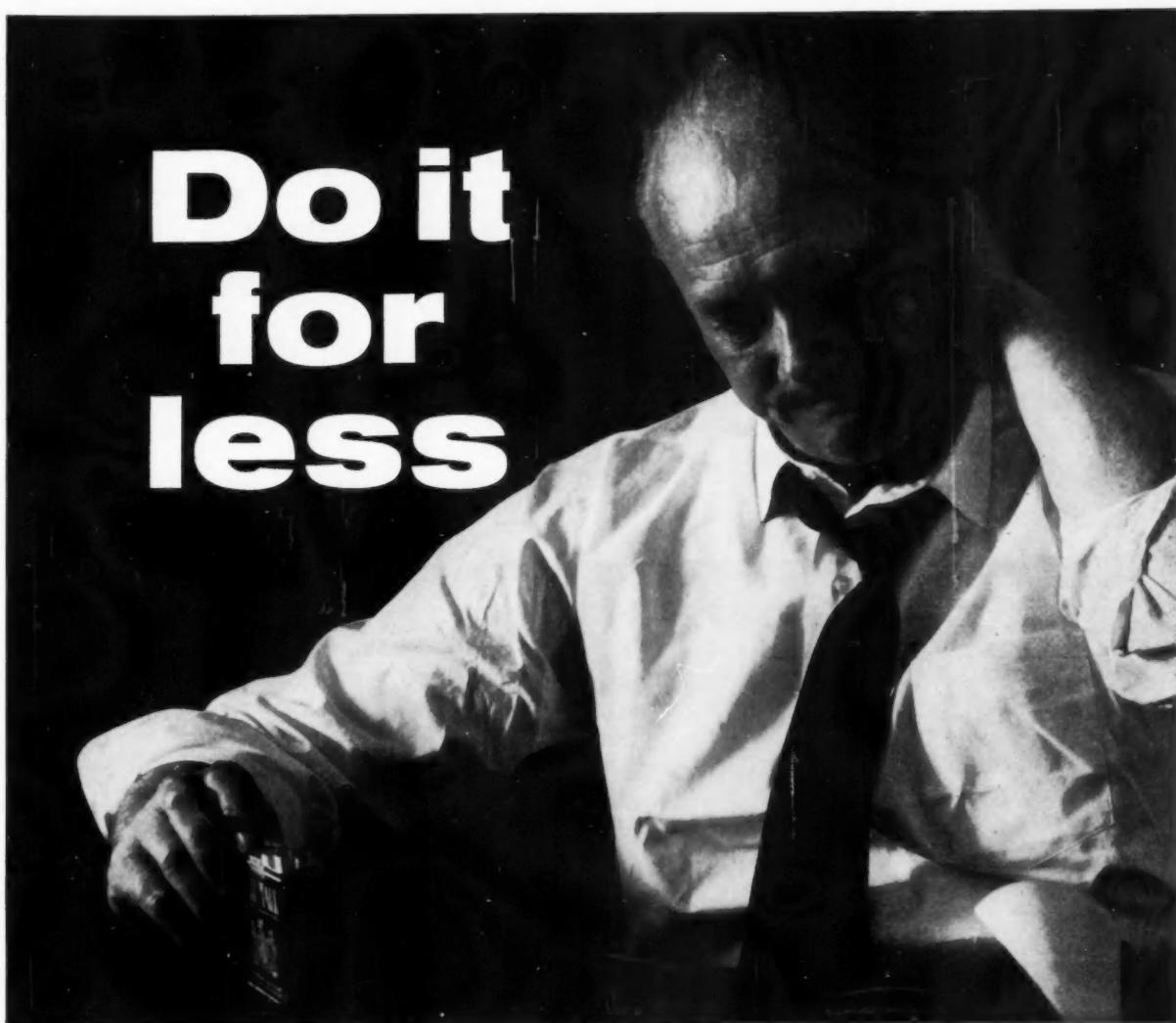
<sup>4</sup>—Valued at \$169,662,000

### NEW TRUCKS

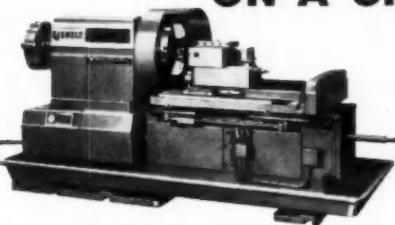
Make	August 1961	July 1961	August 1960	1961	1960
Chevrolet	25,175	28,391	26,738	199,834	220,098
Ford	27,034	26,369	24,539	193,167	194,824
International	11,908	11,123	9,419	73,175	77,063
G. M. C.	6,156	5,596	7,745	44,901	56,411
Dodge	3,660	3,914	3,685	26,806	29,462
Volkswagen	2,680	2,351	2,989	17,935	21,681
Willys Truck	1,257	1,460	1,456	11,175	12,432
White	1,152	1,242	1,095	9,015	10,563
Willys Jeep	1,354	1,151	921	7,474	6,699
Mack	777	800	936	6,003	7,881
Studebaker	332	466	600	3,645	3,616
Diamond T	163	207	248	1,251	1,887
Brockway	98	112	73	643	772
All Others	653	636	998	5,417	9,174
Total—All Makes	81,999	83,620	81,440	600,441	652,563

\* Compiled from official state records. Data property of R. L. Polk & Co. May not be copied, sold or reprinted without Polk permission.

# Do it for less



## ON A GISHOLT SIMPLIMATIC



Gisholt MASTERLINE Simplimatic Automatic Chucking Lathe

- The essence of the building block principle—
- Standard headstock and bed . . . a wide screw-fed platen
- Standard front, center, rear or auxiliary slides with tool blocks
- Positioned to machine a maximum number of surfaces per chucking
- Accessories include JETracer Slides—attachments for simultaneous front and back machining.

**Ask your Gisholt Representative or write for Catalog 1159-C.**

If you think in terms of "specials" to machine rings, discs, flywheels, sheaves, bevel gears, motor frames or complex housings, it will pay you to investigate the Gisholt Simplimatic. You can save money and precious lead time with the flexibility offered by this standard automatic lathe.

Standard "building block" tooling elements provide an infinite variety of arrangements to combine operations, reduce handling, improve quality, and cut floor-to-floor times to a minimum. Many so-called "special" jobs are now being done on the standard Gisholt Simplimatic. We invite you to compare the results. You'll find that you, too, can do it for less!

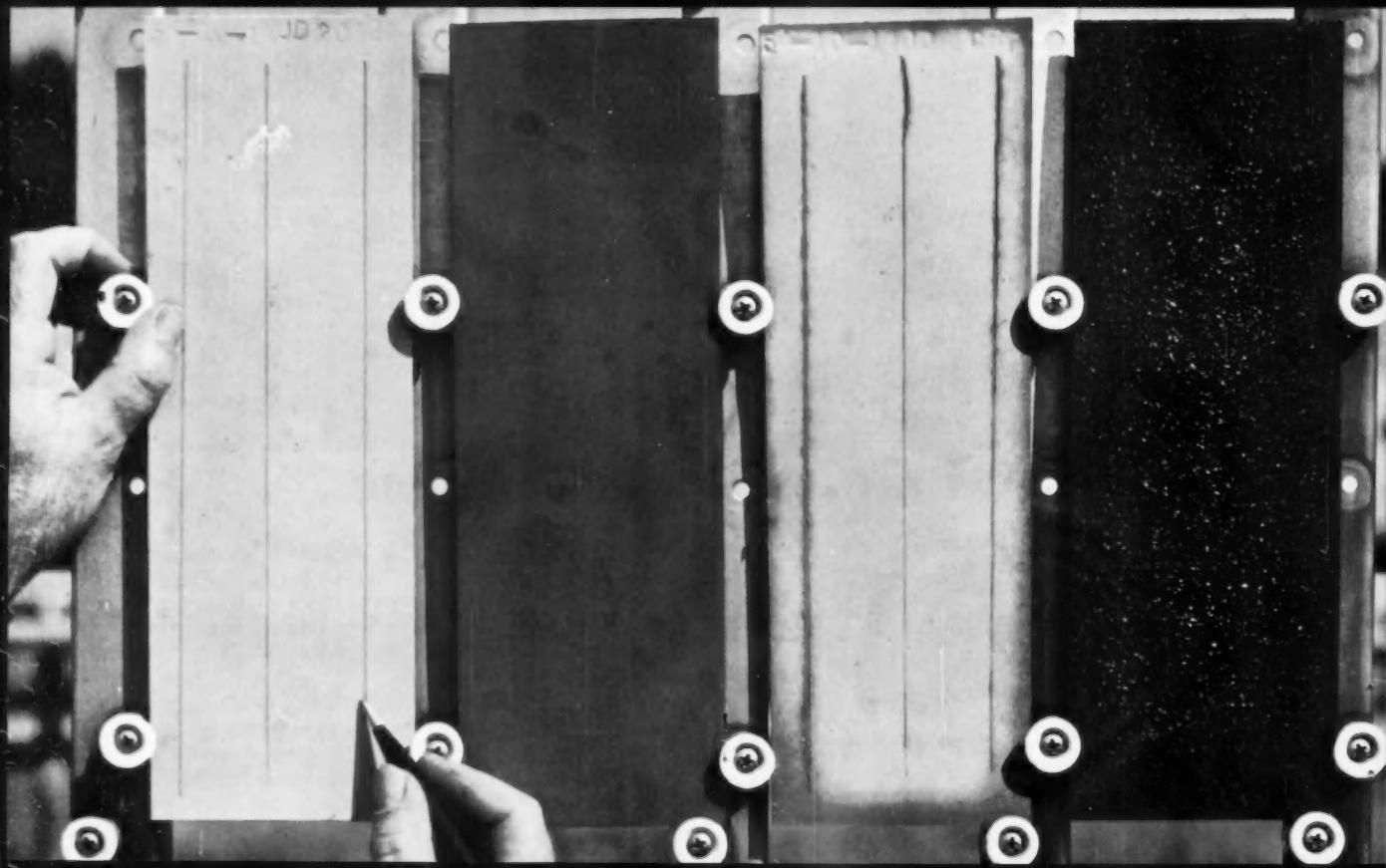


**GISHOLT**  
MACHINE COMPANY  
Madison 10, Wisconsin, U.S.A.

New steels are  
born at  
Armco

**Rout rust, get  
fine finish, protect  
paint with NEW**

*Armco ZINCGRIP A,*



# PAINTGRIP

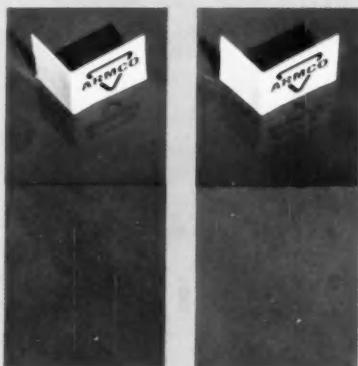
New Armco ZINCGRIP® A, PAINTGRIP® is a spangle-free zinc-coated sheet steel especially prepared to take an attractive paint finish immediately after fabrication. Its hot-dip zinc coating keeps rust away when paint is damaged, protects unpainted concealed parts from corrosion, too.

**More Weldable, Too!** Tests with production equipment show twice as many spot welds can be made on ZINCGRIP A, PAINTGRIP as on ordinary galvanized steel before electrode tips need redressing. It is every bit as workable as Armco ZINCGRIP—the original continuously hot-dip zinc-coated steel.

New Armco ZINCGRIP A, PAINTGRIP is available now in gages from 16 to 24, in cut lengths and coils up to 48 inches wide, depending on gage. Mail the coupon for details.



Use this label  
to indicate  
durable zinc-  
coated steels  
in your products



**ABOVE:** Sample at left is cold-rolled steel, surface treated for painting; sample at right is ZINCGRIP A, PAINTGRIP. Top half of each is painted. There's little to choose from in appearance, yet ZINCGRIP A, PAINTGRIP offers lasting protection.

**LEFT:** The first two samples are painted and unpainted Armco ZINCGRIP A, PAINTGRIP; the third and fourth are cold-rolled steel treated for painting. All were exposed 3 years in Armco's corrosion testing yard. Note absence of rust on ZINCGRIP A, PAINTGRIP, while paint on cold-rolled steel didn't ward off corrosion.

*Three years of outdoor tests show adherence and life of paint on Armco ZINCGRIP A, PAINTGRIP superior to phosphate-treated cold-rolled steel and to all other zinc-coated steels prepared for painting.*

**Armco Division • Armco Steel Corporation**  
2501 Curtis Street, Middletown, Ohio

**PLEASE SEND more data on new ZINCGRIP A, PAINTGRIP.**

NAME..... TITLE.....

FIRM.....

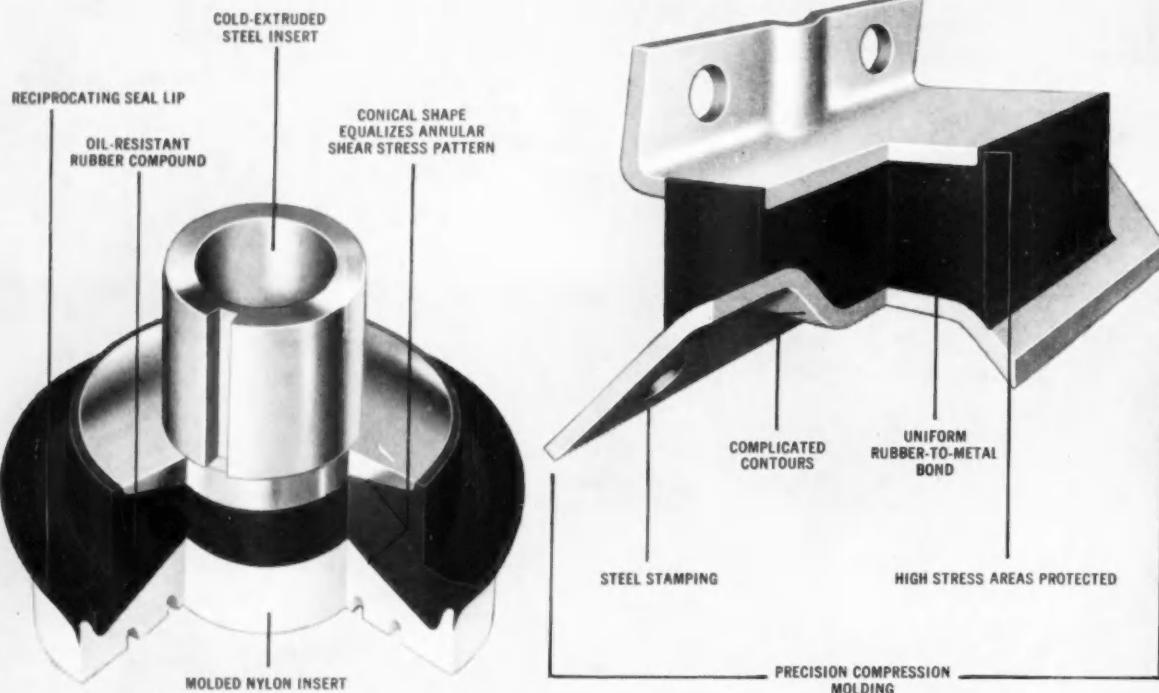
STREET.....

CITY..... ZONE..... STATE.....

**ARMCO** Armco Division

# OHIO RUBBER

"CUSTOMEERED COMPONENTS BASIC TO INDUSTRY"



**FLEXIBLE COUPLING**—"customeered" to a specific rate of torsional shear. **Problem Solved:** Bonding of tough rubber compound to greatly dissimilar materials—steel and nylon. Reliable manufacture in bulk by OHIO RUBBER called for special handling of materials, rigid temperature control, building and maintenance of custom-designed compression molds.

**ENGINE MOUNT**—designed for utmost reliability. **Problem Solved:** Specific rate requirements to very close, demanding tolerances. A good reliable bond had to be achieved despite the inherent complexity of molded shapes necessary. Part components and mating shapes required careful design, calling upon ORCO'S deep experience with materials other than rubber—a specific requirement for economical production.

## How ORCO IDEA PARTS improve your product design

**OHIO RUBBER IS YOUR GOOD SOURCE** for quality rubber or rubber-like automotive parts. ORCO facilities (5 major plants) assure custom engineering, quality-controlled manufacture, reliable delivery and supply. Over 75 years of "CUSTOMEERING" qualifies OHIO RUBBER to serve you well. Call us, at no obligation, today!

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AU-61

# NEW

# PRODUCTS

## AUTOMOTIVE·AVIATION

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

By C. J. Kelly

ASSISTANT EDITOR

### Precision Dial Indicators

Two new precision dial indicators have an A.G.D. accuracy of  $\pm 0.00005$  in. for a 0.015 in. total range (2½ turns). Starrett number 25-109 is a balanced dial indicator with a range of 0-3-0, one revolution 0.006 in., total range 0.015 in.

Starrett number 25-209 is a continuous dial model, reading 0-6, one revolution 0.006 in., total range 0.015 in. Both models are furnished with jeweled bearings. *The L. S. Starrett Co.*

Circle 70 on Inquiry Card for more data

### Compact Car Valve

A cost-saving air-type solenoid valve has been designed especially for operating an automatic clutch in compact cars. The valve utilizes a vacuum system to energize the hydraulic valve in the engine oil system which, in turn, controls the clutch. It has a nylon body, employs a 12 volt coil developed expressly for automotive use, and incorporates a filter for intake air. *American-Standard Controls Div.*

Circle 71 on Inquiry Card for more data

### Tumbling Compound

A heavy, fast cutting abrasive, tumbling compound, called Clepo 205-W, has been developed for cutting metals such as carballoy and other tough metals. According to the manufacturer the material will not break down for periods up to 30 hours. *Frederick Gumm Chemical Co., Inc.*

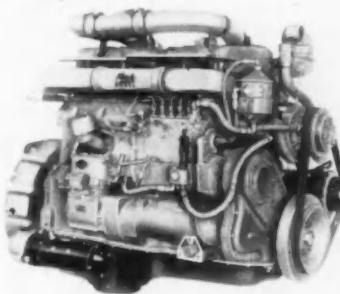
Circle 72 on Inquiry Card for more data

### New Diesel Engine

A new addition to an existing line of Diesel engines has been introduced. According to the manufacturer the new unit is more powerful than previous models with virtually no increase in weight. The new engine has been named the PowerRam Thermodyne Diesel.

The report stated that the horsepower increase was made possible through use of a new air intake principle which increases volumetric efficiency by a full 10 pct. Manifolding on the new unit, used in combination with a matching fuel pump, adds 10 hp to the basic naturally-aspirated END-673 engine of the same manufacturer.

Producing 187 hp if rated as engines of other manufacturers (29.92 in. Hg., 60 deg F), or a full 180 hp



at 2100 rpm (using Mack's conservative formula—30.2 in. Hg., 90 deg F), this naturally-aspirated powerplant features flexibility of performance, the company stated. *Mack Trucks, Inc.*

Circle 73 on Inquiry Card for more data

### New Master Alloy

Announcement has been made of a new master alloy for the titanium industry. A eutectic alloy, it has a nominal composition of 50 pct molybdenum, 45 pct aluminum and 5 pct titanium. The new material is a high purity, low melting point alloy (1760 deg C) which is free of molybdenum segregation.

Its primary use is in the production of three alloys of titanium: 1—7 pct aluminum, 3.5 pct molybdenum—for plates, bars, billets and wire; 2—4 pct aluminum, 1 pct molybdenum, 1 pct vanadium—for sheet and strip; 3—8 pct aluminum, 3 pct molybdenum, 1 pct vanadium—for forging bars, discs, spacers, blades, etc.

The new VCA master alloy is particularly suitable for these titanium

products. Its use assures satisfactory performance in fabrication and service, especially where high temperature strength, formability and creep resistance at elevated temperatures are required. *Vanadium Corp. of America.*

Circle 74 on Inquiry Card for more data

### Crankcase Ventilator

A system for filtered and controlled crankcase ventilation has been developed to increase motor efficiency and reduce maintenance costs. The device extracts impurities from the crankcase and deposits them in a residue jar. In addition to saving wear on the engine the filtering unit also aids in preventing undesirable elements from being deposited in the air. *Oildex Corp.*

Circle 75 on Inquiry Card for more data

### Vibration Damper

A newly designed crankshaft torsional damper has been introduced. The torsional member and its rubber envelope on the new device have a special wave form configuration. The new concept constrains the rubber member to operate in a combination of shear and compression. This, according to the manufacturer, contrasts with the shear mechanism of most conventional dampers. The combined action of the rubber in this design is said to retard the movement of the inertia member, eliminating the over-stressing of the rubber fibers in shear.

The manufacturer's report states that this damper offers good performance at high engine speeds where crankshaft strains are severe; the oscillation of the inertia member being held under control since the rubber tends to be in compression between the retainer and inertia member vanes. In addition to vibration control the new damper is reported to be cool running and holds promise of long service life. *H. A. King Co., Inc.*

Circle 76 on Inquiry Card for more data

# Allis-Chalmers New Engine Plant

(Continued from page 54)

crankshaft thrust faces are finished-faced, simultaneously in a vertical Ex-Cell-O precision-boring machine.

This cycle commences as the fixture rapids to the left. This causes the block to move over the horizontal boring bar and also to become positioned relative to the vertical boring quills. The vertical slide rapids downward and the fixture slide is clamped. Cylinder boring commences on alternate holes, while on the horizontal slide the thrust face facing tools are fed hydraulically outward from their rotating boring bar. This bar pilots on needle roller bearings in two previously finished crankshaft bearing holes. As the vertical cylinder boring quills with micro-adjust tools reach the end of their stroke, a chamfering operation is performed within the cylinder bores by using a hydraulically fed form tool operated from within the boring quills. An individual stop on each spindle assures a close tolerance on the depth of the counterbore at the top of the cylinder bores.

When the boring quills have returned to their start position, the fixture indexes and the remaining cylinder bores are similarly machined.

The ends of the blocks now are finish-milled in a K & T milling machine. And this is followed by a wash in the second Centri-Spray machine. Final operation is the pressing-in of cam bushings, and final inspection.

Before leaving the machine line, it may be noted that chip conveyors are installed below the floor under each major machine line. These feed out to one end of the department where a chip elevator delivers the loose chips to a hopper.

The cylinder block constitutes the backbone of the engine assembly and as each block is accepted by inspection it is ready for scheduling to the assembly department. Here they have four, flush pallet type, power-driven assembly conveyors installed by Jervis B. Webb. As will be shown later, these conveyors carry pedestal type fixtures to facilitate the assembly opera-

tion. An interesting feature here, as illustrated, is the provision of easy-to-reach stock bins arranged at each station on both sides of the line. These carry a full supply of small parts and fastenings required at the station.

Probably by the time this article is in print there will be another assembly line conveyor in place, this one for the assembly of industrial power packages of all kinds.

Profiting by the practice in recent years in the great plants of the automotive industries, A-C worked jointly with Jervis B. Webb on the design and installation of the four power-driven engine assembly conveyors; and an impressive installation of power-and-free conveyor systems for transporting finished engines from the assembly lines to the test area, and out of the test area to washing and painting.

At the present writing there are four power-driven, flush pallet type conveyors for engine assembly: one for gasoline engines, and one for small Diesel engines, each running some 240 ft in length; two for the larger Diesel engines, each running about 300 ft in length. The assembly conveyors are fitted with massive pedestal type fixtures so designed as to permit handling of an engine assembly in three specified positions. In addition, the fixtures for the two smaller engine lines have 360-deg rotation.

Positioning of an engine for each of the three basic aspects is done by means of hoists on the bridge cranes serving this area.

Turning to the power-and-free conveyor complex, it may be summarized as follows: the basic flow is to pick up completed engines from each of the assembly lines; deliver engines to the gasoline engine test area, in the case of gas engines; deliver Diesel engines to the proper test area, route engines off the main line to the repair area, when necessary; delivery and accumulation (storage) prior to paint; through painting to unloading for shipment. The entire system includes some 150 engine carriers.

To insure continuous and unin-

terrupted flow, automatic deflector switches are installed at certain critical points. Here they have seven automatic switches and 35 manual switches, the latter being subject to operator control.

Each carrier is provided with the familiar four-position routing selector which is positioned manually at the assembly line to indicate that the engine is gas or Diesel for proper routing in the test area. After testing, the selector is positioned manually to route the engine to the delivery and storage conveyor enroute to painting.

The test delivery conveyor transports an engine mix at relatively low speed, thus permitting easy routing into the test stations. At this point it is the responsibility of the operator to open a manual switch only for movement of test engines. It is noteworthy that the smaller and lighter gasoline engines remain on the carrier during the test cycle, thus they are switched off the power conveyor and are pushed manually over a test stand.

Turning to the layout of the conveyor system, it will be noted that conveyor V transports small engines from the assembly conveyors to conveyor line VI for transport to test. During this cycle of events, engines are automatically switched to one of a number of storage conveyors while waiting for test stands to clear.

Power-and-free conveyor VI transports engines through masking and torquing; wash and paint; unload; then it returns and stores the carriers.

Conveyor VI-A is used for storing carriers for large engines between test and paint. Conveyor VII, in turn, transports and stores large engines from the assembly lines to the test area; also serves to return empty carriers.

Engine testing has been developed in outstanding fashion with control of many of the usual variables said to be held to closer limits than is customary even in research test cells. Such precision of control is attributed to the instrumentation developed by Minneapolis-Honeywell for the Diesel test stands.

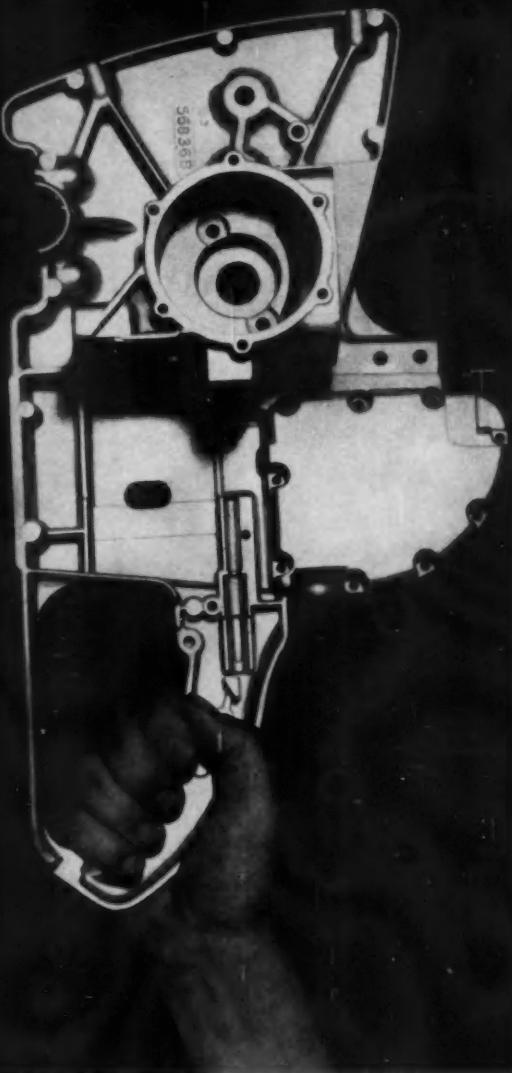
As mentioned earlier, gasoline engines are hot-tested without ex-

(Turn to page 91, please)



Multi-part assembly...

CHAIN SAW DIE CASTING. SHOWN THROUGH COURTESY OF DOEHLER-JARVIS, TOLEDO, OH.



or "assembly in the die?"

## WHICH PROVIDES THE COST-CUTTING EDGE FOR YOUR PRODUCT?

If your product involves the assembly of two or more related metal parts, the chances are you can make important savings and a better product by having assembly "done in the die." Skilled one-piece die casting by Doepler-Jarvis cuts tooling and metal costs to the bone . . . saves you time and money at every assembling and joining stage. You save on rejects, too —

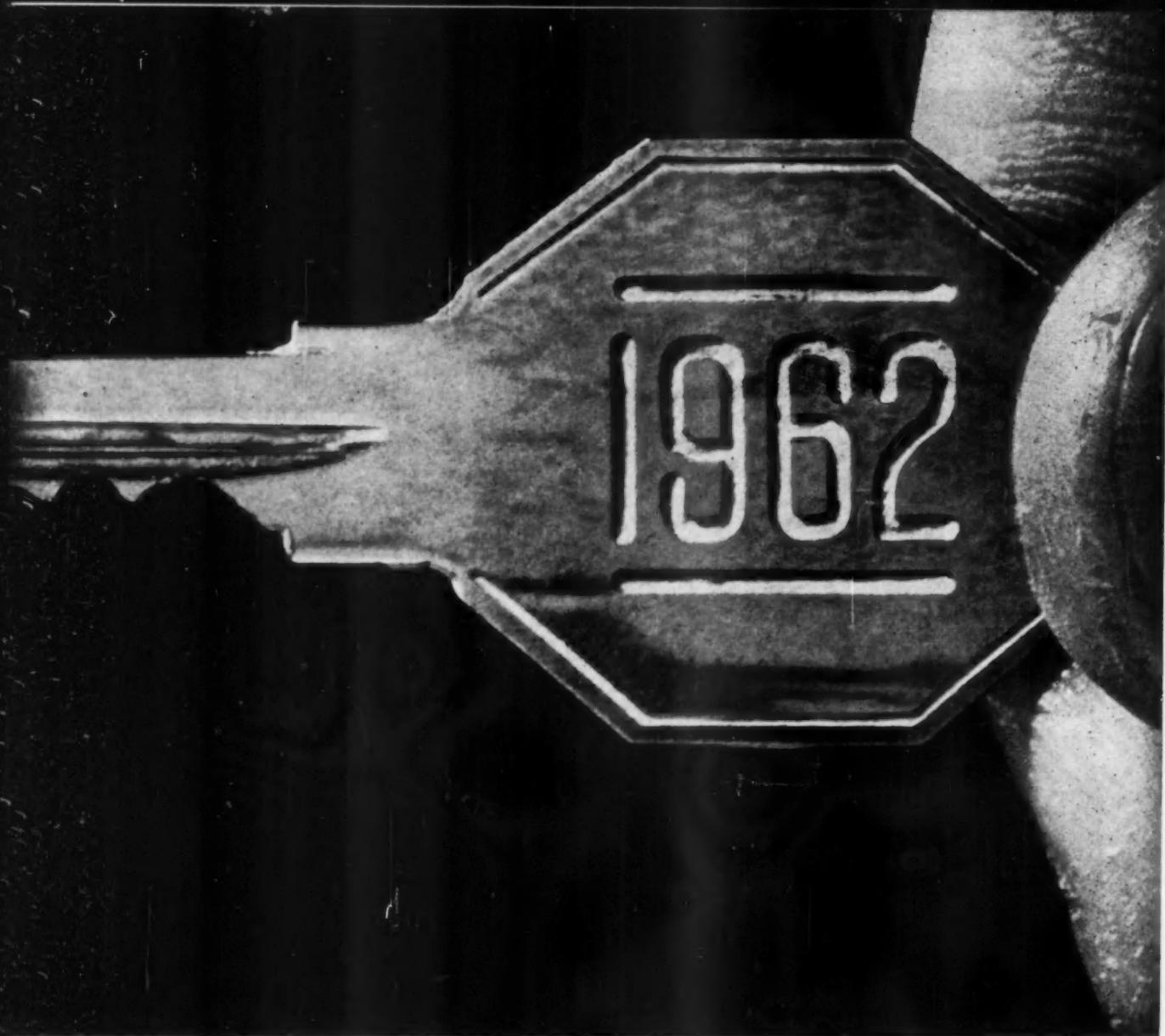
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## *A new feel in driving*

### **When the nation's motorists turn the key...**

...they'll agree. The new '62's act better. Look better. *Feel* better to drive than cars of any other year. In fact they're stepping out with more power per pound than any in history!

If the new cars feel better, it's largely because firms who supply parts to Detroit—working with Kaiser Aluminum—helped make each car *lighter* with aluminum.

**Aluminum engines dump the weight.** Ten per cent of the 1961 cars have aluminum engines. You will see more of them in future cars. One reason: the first big die-cast aluminum engine blocks—result of a ten-year die-casting development program by a casting supplier, assisted by Kaiser Aluminum.

These aluminum engine blocks can dump out as much as 200 pounds overall weight and bring other advantages of durability, cool running, and high production rate. Adding to a growing list of other aluminum parts—from transmission housings and brakes to hundreds of small items—aluminum engines are creating lighthearted new cars.

**Trim new metals.** One of the major contributions for '62 is victory in the search for dent-resistant aluminum for trim. The suppliers of trim guided development and factory tests of a new alloy—Kaiser Aluminum Alloy 5252. In the new cars Alloy 5252 delivers impact resistance and appearance comparable to more costly metals. Uses the same fasteners. Eliminates rust along trim edges. And knocks off still more dead weight.



## *starts here!*

In each part where aluminum makes a debut in '62, it brings lightness, economy, performance . . . helps create a new feel in driving.

Kaiser Aluminum is pleased to be at the heart of this trend. Our plant on the Ohio River, at Ravenswood, W. Va., serves Detroit as the nearest fully integrated aluminum development and production center.

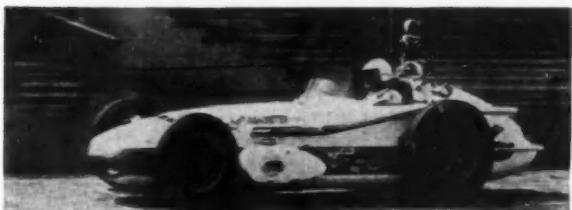
For experienced assistance in any automotive engineering or design problem that involves use of aluminum, contact Kaiser Aluminum Automotive Industry Division, IBM Bldg., Detroit

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Watch Kaiser Aluminum's salute to lighthearted "Low Calorie Cars"

See Indianapolis winner Rodger Ward take the driver's seat for a thundering television message up to 170 mph. He'll be showing millions the advantages of lighter weight in beautiful "low calorie cars"—the slim, trim new 1962's!

On "Follow the Sun", Sundays, ABC-TV (Channel 7 in Detroit)





*A new feel in driving starts here*

These suppliers helped make the new '62 cars trim, light and powerful with Kaiser Aluminum:

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**ALUMINUM**

AUTOMOTIVE INDUSTRY DIV., IBM BLDG., DETROIT 2, MICH., TR. 3-8000

# MANUFACTURERS' NEWS



## Solar Steel Expansion

Installation of a specialty strip mill operation, capable of producing more than 30,000 tons a year, is nearing completion at the Precision Strip Mill Div. of Solar Steel Corp., in River Rouge, Mich. This installation marks the latest step in a \$2 million expansion by Solar, which just completed installing an automated welded tube mill at its plant in Union, N. J.

## Sealed Power's New Plant

Sealed Power Corp. has announced plans to build a new casting and machining plant in the Muskegon, Mich., area. The new plant will cast and rough-machine cylinder sleeves with emphasis on sleeve liners for aluminum engines. The building will contain about 50,000 sq ft of floor space and total investment in plant and facilities will be \$1.5 million.

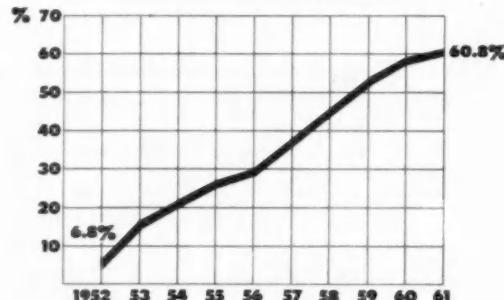
## Motec Sales Up 20 Pct.

Motec Industries, Inc., has reported net sales for the first nine months of fiscal 1961 were \$41.1 million, an increase of 20 per cent over the 1960 period when sales were \$34.2 million. Net income was \$718,935 against \$1.6 million last year when Motec paid no income taxes.

## Growth of Power Steering

Only 10 years old, power steering systems of the Saginaw Steering Div. of General Motors Corp. have had phenomenal public acceptance. Introduced in 1952, Saginaw power steering was used on only 6.8 per cent of GM pro-

### PERCENTAGE OF POWER STEERING USED ON GM FULL-SIZED CARS 1952-1962



duction that year. Ten years later, the percentage had soared to 60.8 per cent of 1961 GM conventional-sized cars and 20.8 per cent of GM small cars. Today's power steering, far more efficient than a decade ago, is offered for an average of \$92 less than in 1952.

ENGINEERING  
DEPT.  
19



## BCA DELIVERS NEW DESIGN DATA

*for personal discussion on all ball bearing applications!*

Whenever BCA submits engineering drawings and calculations to a customer for a new ball bearing application, they're delivered in person by a BCA engineer. He can discuss the problem and our suggested solution, explaining how and why this particular design is best for the job to be done. Only in this way can you get the personal consultation essential to solving many bearings problems.

When new ball bearing applications or design changes are required, BCA engineers to the precise degree that operating conditions require. Bearings *must not* be under-engineered, at a risk of bearing failure; neither should they be over-engineered, at unnecessary extra cost. These are but a few of the factors which must be considered in bearing design. This is why the BCA personal approach offers a decided advantage to our customers.

Another important BCA "extra" is unusual flexibility in operation. Because we can eliminate red tape and wasted time, many of our customers have found we can even handle delivery or production emergencies in good order.

BCA also has available complete new research and engineering facilities and equipment. Included are special bearings testing machines which can duplicate many of the customers' actual operating conditions.

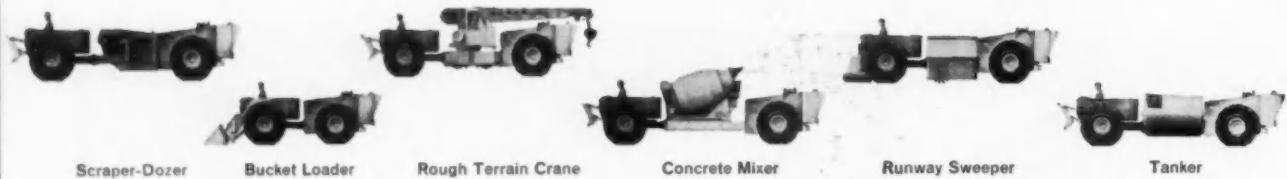
BCA makes ball bearings for OEM and replacement use, for almost every industry . . . construction, agriculture, automotive, machine tool. They're available in a complete range of sizes and types. For information or for technical assistance on bearings problems, contact Bearings Company of America, Division of Federal-Mogul-Bower Bearings, Inc., Lancaster, Pa.



**BEARINGS COMPANY  
OF AMERICA**

ball  
bearings

DIVISION OF  
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BEARINGS, INC.



Scraper-Dozer

Bucket Loader

Rough Terrain Crane

Concrete Mixer

Runway Sweeper

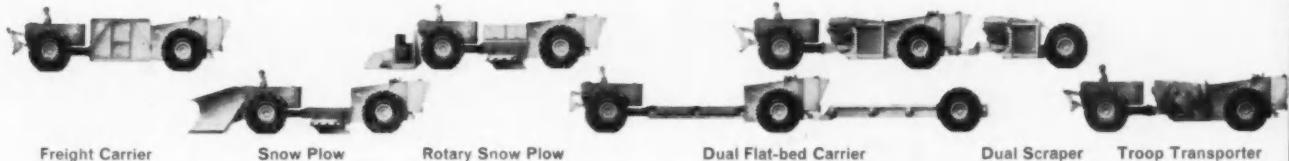
Tanker



Army Universal Engineer Tractor built by Hendrickson Manufacturing Company, Lyons, Illinois. Strength with light weight obtained with use of USS "T-1" Constructional Alloy Steel and USS MAN-TEN High Strength Steel.



This mark tells you a product is made of modern, dependable Steel.



Freight Carrier      Snow Plow      Rotary Snow Plow      Dual Flat-bed Carrier      Dual Scraper      Troop Transporter

# *It digs it flies it swims*

and does a dozen other things!

The Universal Engineer Tractor, rubber tired (RT), can do the work of a dozen different machines merely by substituting interchangeable sections. Basically, it is a 250 HP steel tractor-scraper dozer that can be flown in a C-130 Aircraft (they call it UET-RT) and parachuted into a combat area, and ready to operate. In addition, being sectionalized, it can be quickly disassembled for transport by other types of aircraft. The tractor, although it is lightweight for airborne use, can transport 10 cubic yards of earth at 35 MPH. It was designed by Barnes & Reinecke, Inc., Chicago engineers, to the requirements of the United States Army Engineer Research and Development Laboratories at Fort Belvoir, Virginia. Three and a half tons of weight were saved by designing the yoke, dozer arms, front and rear axle housings, and basic bowl structure with USS "T-1" Constructional Alloy Steel. "T-1" Steel's minimum yield strength of 100,000 psi permitted working stresses of 60,000 psi. USS MAN-TEN High Strength Steel with 50,000 psi minimum yield point, in the bowl, side plates and dozer blade saved more weight. The complete unit was built tough and strong with 7,500 pounds of USS "T-1" and MAN-TEN Steels. For other military vehicles, United States Steel makes extremely tough, rolled armor plate, in addition to a complete line of weldable, formable, high strength and alloy steels. For more information, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS, "T-1" and MAN-TEN are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division • National Tube Division • Tennessee Coal & Iron Division • United States Steel Supply Division • United States Steel Export Company



**United States Steel**

## Die Stamped Circuits

(Continued from page 59)

### Specifics for Die Stamped Circuits

In addition there are a number of specific design practices which should be observed in making layouts for die stamped circuits. These may be summarized as follows:

- Keep in mind the number six hundredths. Line widths, space between lines, size of land or boss area, and distance be-

tween conductor edges and edge of a panel should not be less than 0.06 in. Circuits with narrower lines, smaller lands or bosses, and less spacing can be produced, but only at increased circuit cost and with lower circuit reliability.

- Avoid sharp corners and sharp connection points by designing fillet radii. An ideal radius is 0.12 in., but 0.03 in. can be maintained.
- Preferably design boards with pattern on one side only of

the base material. Boards can be designed with patterns on both sides, but designing with pattern on one side only eliminates through-hole connections, which present many inherent production problems and substantially increase the cost of the finished product.

### Accurate Artwork

A die stamped circuit will be as accurate as the die which produces it, and the die in turn will be only as accurate as the artwork from which it is made. Inked drawings on a dimensionally stable material such as white background board or Mylar or polystyrene film is highly recommended. The drawing for each circuit pattern should be made on a single piece of material.

Artwork should be supplied from two to six times the actual dimensions, depending on the size of the part to be produced from it. Small parts (less than 10 sq in.) should be drawn from five to ten times finished size.

For lowest cost and highest reliability, standard fabricating tolerances should be specified.

Aside from correct design, complete specifications should be furnished to the manufacturer of the die stamped circuit to avoid unnecessary delays either in quoting or in filling the order. ■

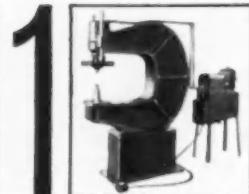
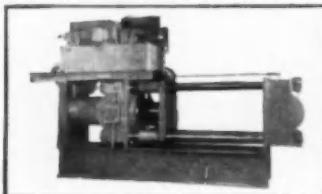
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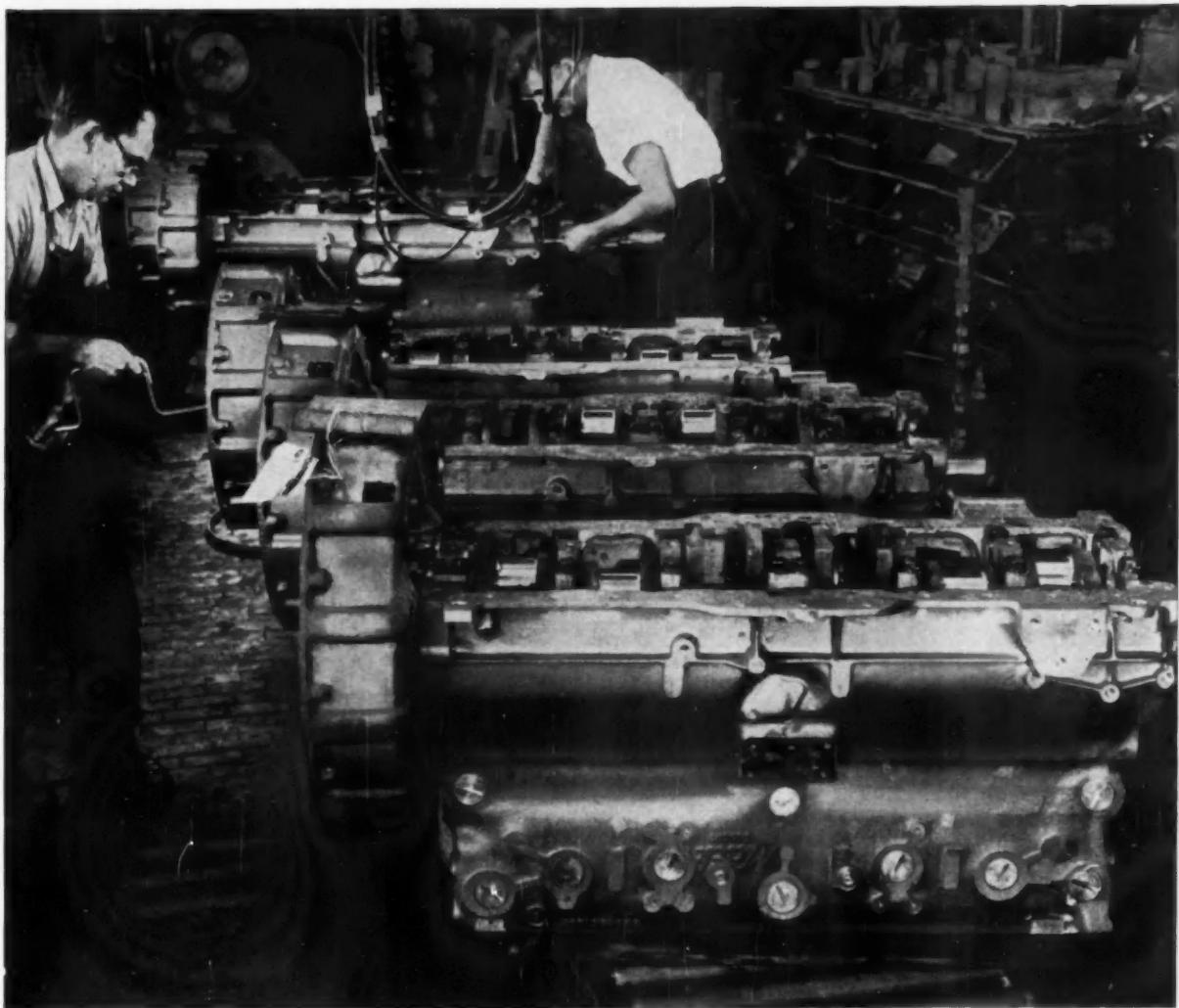
## Vehicle Registration

(Continued from page 22)

California is expected to be in the lead with total registrations of 7.86 million, followed by New York with 5.1, Texas and Pennsylvania both with 4.5 million, and Ohio with 4.1 million registrations.

One state, South Carolina, is presently indicating a decrease in passenger car registrations. Eleven states are showing slight decreases, from the 1960 truck and bus registrations. However, it is quite possible that when final reports are available at the end of the year that many of these decreases will be eliminated.

Complete details for each state will be found in the accompanying table of estimated registrations by states compared with actual data for 1960. ■



On the Mack assembly line, operators bolt the rear engine housing to the nickel cast iron block. Farther down the

line, pistons are installed, using Ni-Resist piston ring inserts. Later, the nickel cast iron cylinder heads will be added.

## How nickel-alloyed castings help Mack diesels deliver extra years of road power

**"Built like a Mack"** means years of low-cost operation, hundreds of thousands of miles of payloads. And the 17-year combination of Mack engineering skill and nickel-alloyed castings makes possible the rugged reliability of these famous Mack Thermodyne diesels.

**For the pressure tightness needed** in the block of a high-compression diesel, Mack engineers specify nickel cast iron. Its strength and durability fight off corrosion, resist cracking and warping. The heads, too, are made of tough, long-lasting nickel cast iron.

**For longer, smoother engine life**, Mack engineers specify Ni-Resist\* piston ring inserts with 13½ to 17½% nickel to keep piston rings gas tight. Ni-Resist inserts stand up to the pounding of the rings, take the punishment of corrosion and heat without failure. "Blow-by", power loss and excessive oil consumption are eliminated.

**To keep your diesels out on the road** for profit—not in the shop for repair—make sure you specify and use engines with nickel-alloyed parts. They bring those extra years of service that slash operating costs.

\*Registered trademark

THE INTERNATIONAL NICKEL COMPANY, INC.  
67 Wall Street  New York 5, N. Y.

**INCO NICKEL**  
NICKEL MAKES CASTINGS PERFORM BETTER LONGER



Photo courtesy Cushman Motors

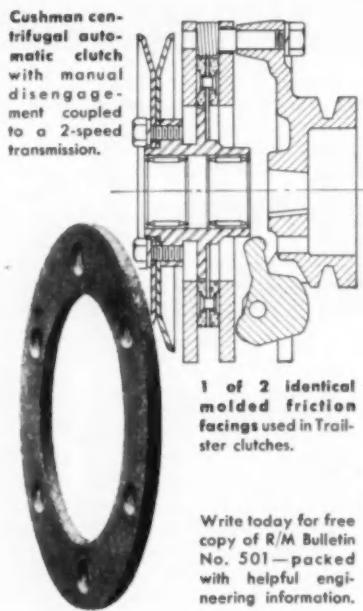
## R/M found friction material answers for versatile Cushman Trailster

"We placed our friction problems for the Trailster's centrifugal automatic clutch in Raybestos-Manhattan's hands," says R. D. Von Seggern, assistant chief engineer, Cushman Motors, Lincoln, Nebr.

"Cushman has been using Raybestos-Manhattan friction materials in various models of utility vehicles for over 15 years. Based on past experience, we know we can rely on them for assistance at every stage—from design to production.

"We needed a friction material capable of withstanding high heat generated by slippage until the centrifugal clutch engaged. It had to have a uniform coefficient of friction over a wide temperature range and low wear characteristics. R/M was able to develop a molded material which meets these requirements."

Why not take a tip from Mr. Von Seggern—call on us and make use of our knowledge of friction accumulated from 50 years of experience. Just phone or write—a sales engineer can be at your desk within 24 hours. Remember . . . only R/M makes all types of friction materials; your assurance of unbiased council.



Write today for free copy of R/M Bulletin No. 501—packed with helpful engineering information.



## RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION: Bridgeport, Conn.

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## Purchasing at Chrysler

(Continued from page 45)

tral staff—manufacturing engineering and must have concurrence there. Of course, it is also a fact that even when new ideas pass muster a buy cannot be made unless there is budget approval at the corporate level.

Now that we have looked at purchasing and manufacturing engineering, we shall have to consider how these functions are linked.

When a purchase request is processed, it goes through the chain of communications to central purchasing where it is screened by the head of the department and screened by the purchasing research group.

Finally, it is noteworthy that this centralized procedure and control has some unique advantages. To cite a specific example: In most organizations a change or improvement in one plant may not necessarily filter through to other plants or other departments. At Chrysler, if one assembly plant or one engine plant develops a new method or finds an advanced piece of equipment or automation device, the same idea will be extended simultaneously to all other plants in the group. The mechanism for this is in the responsibility of the group vice-president and his manufacturing staff.

Finally, it must be clear to suppliers that any competitive piece of equipment necessarily must be exploited in many ways to effect recognition at every level in the organization outlined above. Personal contacting alone is not the answer because of the many channels of influence. New methods, new ideas must be exploited through literature, trade publication editorial articles, and the proper kind of advertising message, aimed at reaching most, if not all, of the individuals involved. It has been the experience of the writer, in fact, that such product identification must clear the channels before personal contact is attempted.

*Reprints of this article available on request as long as supply lasts.*

## Annual Meeting of AMTDA

(Continued from page 63)

the machine and also to develop prospects for other machines.

In summary, Mr. Bailey in presenting Mr. Beggs' remarks said, "may I emphasize that you should get in early to assist the plants in determining whether or not they need to replace equipment, assist them in making their investment analysis and maintain contact with them through the various stages in the procedure for approval, and then check back to see if you can be of help in making the post-completion audit."

### Another User's Views

Donald C. Burnham, vice-president of manufacturing, Westinghouse Electric Corp., commented on the general policies and procedures followed by his company in a presentation entitled "Selling the Needs of the User." His remarks contained the following information:

Westinghouse buys about \$40 million of machine tools and equipment annually—the amount not fluctuating greatly from year to year.

Machinery is bought for three major reasons: (1) to produce a new or improved product, (2) to achieve cost reductions, and (3) to obtain added capacity. The most important reason is cost reduction.

It is believed that more equipment will be bought for cost reduction than for increased capacity—and it follows that added capacity is obtained with cost-reduction equipment. The policy is to provide, if possible, increased productive capacity by improving the manner in which the work is done—rather than by increasing floor space.

Mr. Burnham indicated that Westinghouse modernizes facilities when an overall annual saving of 20 per cent or more will result from the added investment.

In analyzing the cost-reduction potential of new equipment, Westinghouse includes these factors:

- (1) Direct labor
- (2) Indirect labor
- (3) Overtime premium and extra allowance
- (4) Employee benefit costs (vacations and holidays applicable to 1, 2 and 3)

- (5) Reduced defective work charges in plant and in field
- (6) Reduced maintenance of proposed facility compared to old
- (7) Annual reduction in tool costs, including tool maintenance
- (8) Reduction in direct materials
- (9) Reduction in indirect materials
- (10) Inventory change (in-process inventory)
- (11) Floor space change

Mr. Burnham said that facilities are retired when they are not required to produce standard volume currently or anticipated volume in next three years, on a two-shift operation.

Westinghouse believes the older a machine is the more it should be questioned—and Mr. Burnham noted that any machine over 10 years' old offers the machine supplier a challenge to show how its replacement will show a 20 per cent or more return on investment.

He commented that it is vitally important for the machine tool distributor to contact the man who is working on the company's problems. And that the distributor should be fully aware of developments in the machine tool field and how they fit into his product.

### NEW OFFICERS

The new officers of AMTDA for the Association year 1961-62 are: **President**—Irvine B. Rabel, president of Star Machinery Co., Seattle. **Vice-President**—C. Denson Day, president of Machinery Associates, Inc., Wynnewood, Pa. **2nd Vice-President**—William L. Walker, president of Walker Machinery Co., Cincinnati. **Secretary-Treasurer**—Robert W. Nissen, president of The E. L. Essley Machinery Co., Chicago.

New **Executive Committee members** are Robert A. Brechter, vice-president and secretary of Vandycy Churchill Co., New York; John L. Addy, Jr., partner in the Addy & Luby Machinery Co., Detroit; and Phil R. Hoffman, vice-president of Hoffman-Marquard Machinery Co., St. Louis. ■

# How to choose the best adhesive

Proper selection of the best adhesive for a given application can reduce your costs and improve your product. There is no known all-purpose adhesive.

To choose the best bonding agent, you must assign degrees of importance to the following five factors:

- Heat resistance and strength requirements
- Viscosity and hot-flow characteristics, if heat-setting type is favored
- Temperature limitations of the available processing equipment and materials to be bonded
- Resistance to various liquids and gases to which the assembly might be exposed
- Chemical and physical properties of materials to be bonded

How much importance to each point? That is where Raybestos-Manhattan's years of experience can prove profitable for you. Almost all the Ray-BOND adhesives available today can be effectively modified to meet your particular bonding requirements. We would welcome the opportunity to work directly with you to select or develop the type or types of adhesives best for your purposes. A Raybestos engineer can call at your convenience. Won't you let us hear from you soon.

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FOR FREE BULLETIN  
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Have an engineer get in touch with me.

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# METALS

*Steel Producers Do Not Anticipate an Early Increase in Their Operating Rate Above the Present 74 Per Cent of Capacity.*

By William F. Boericke

## Strikes Slow Up Steel Buying

Optimism in steel circles in mid-October was somewhat tempered by the strike at the Ford plants, with Chrysler bargaining yet to come. Steel producers are more cautious in predicting a rapid pick-up, and fear it may be some time before there is any noteworthy improvement over the present 74 per cent operating rate. The auto manufacturers appear unwilling to order steel until they are assured of uninterrupted production on the assembly line. This means there will be no upward push in steel output until the final labor contracts are signed. Buying still is almost en-

tirely for quick consumption with little attempt to build up inventories in anticipation of better business later on.

## Brighter Prospects But No Buying Surge

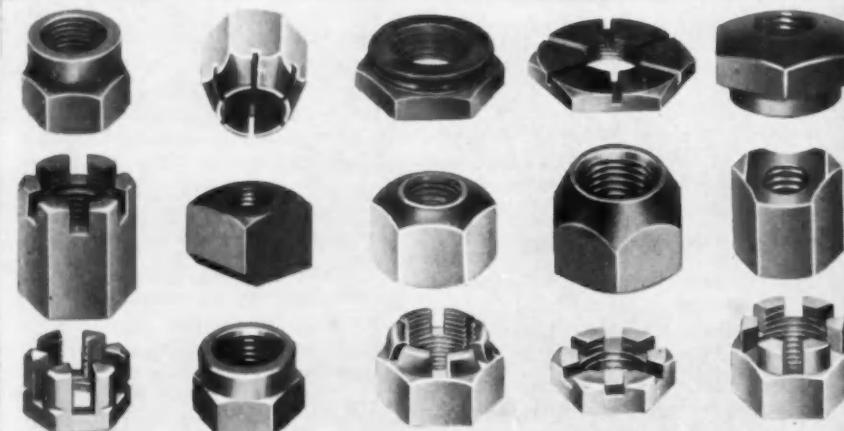
Yet this is not to deny there has been some general improvement across the board. Most steel officials expect that October production will at least be equal to output in September, when the industry poured nearly 9 million tons of steel. One large company's prediction is that October ingot production will exceed September by about 5 per cent. November still is a question mark. If final negotiations on the labor front are not too long delayed, steel demand from Detroit would be a big factor in pushing up the operating rate.

## Galvanized Sheets Holds First Place

Galvanized sheet remains the strongest steel product with orders from manufacturers extending through November. Demand for tin plate is easing seasonally but is holding up somewhat better than expected. Oil country goods are slow. The market for construction steel has been good, and a mill with a full range of heavy steels and coated products saw nothing wrong with the steel recovery.

## Steel Scrap Weakens

On the other hand, the price of industrial scrap has weakened, apparently reflecting a leveling off in steel production and lower exports, as well as the use of hot metal from idle blast furnaces. Premium scrap has dropped about \$3 a ton



Very often the special nut you require may be similar to one we are already making and a simple modification would result in a price advantage and quicker deliveries to you . . . in the field of locknuts we have made spectacular progress. Besides standardized hexagon "Conelok," "Huglock" and "Marsden," sizes #10 to 3" of ferrous and

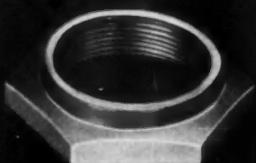
non-ferrous materials, we provide many special application nuts, upon a basis of these designs . . . a few of which are shown (below) . . . our sales and engineering departments are available to help you solve your fastening problems.

## S P E C I A L S

$7/16$ " —  $4\frac{1}{4}$ " across flats  
As the largest specialized nut manufacturer in the world we are constantly developing new methods and products for this phase of assembly in industry. Our batteries of special high speed multi-spindle, automatic machines make possible fast and accurate production of hexagon nuts of non-standard height and special shape from carbon or alloy steel, Naval Bronze or other non-ferrous metals, also AN310 through AN335 as per latest Airforce specifications.



Send for 16-page condensus catalog, it includes complete specifications, as well as engineering data.



**NATIONAL MACHINE PRODUCTS COMPANY**

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in Pittsburgh. This decline followed general price reductions throughout the country.

### Price of Ferro Chrome Advanced

Manufacturers of ferro alloys raised the price of chrome in alloys about 2 cents a pound. Ferro chrome was hiked about 5 per cent. The upward adjustment was long overdue, as prices have been unsettled at unprofitable levels for many months. The move, instituted by Union Carbide, was quickly followed by the other two principal suppliers. The increase was necessitated by the poor price-cost relationship which now exists in these alloys. The new prices, effective October 15, take into account the penalty which a stainless steel producer experiences in using the higher silicon grades of low carbon ferro chrome, which limits the extent to which he can use lower cost chromium in the form of ferro-chrome silicon.

### Copper in Good Demand; Foreign Sales Increase

Domestic demand for copper is good and foreign sales which declined from a record level earlier in the year have bounded upward again. After having fallen to 25 cents a pound, the price of copper scrap firmed, and scored the first advance since late September. On the London Metal Exchange the metal recovered about 1 1/4 cents a pound which brought the price back to 29 cents in mid-October. This has cut the differential between New York and London to 2 cents a pound. It has been historically true that if the differential does not exceed 3 cents there is little pressure on the domestic price. In the opinion of copper executives the present 31 cent price is firmly established for the rest of the year.

The price could advance in spite of producers' expressed opposition. Resumption of strikes at the important Chilean copper mines after November 11 is a possibility when the present 60-day truce expires. In short, copper supply is still subject to unpredictable interruptions and the market could get out of control by the producers who want to see the price stabilized at the present level. ■

## Machine Tool Builders Report Improvement

(Continued from page 50)

tive in November, December 1, January 1 ("not across the board, only on certain items"), and January-February, respectively.

Another company lists a 6 to 10 per cent rise, with a question mark on the effective date.

The eighth company reports a 7 per cent price increase to be effective in 2nd Quarter '62.

A company beyond the 8 commented, "Depends upon our suppliers."

### RECOMMENDATIONS

Finally, the machine tool builders were asked, "Do you have any personal recommendations to make at this time to automotive industry officials which should be taken into account by them when planning for near-future machine tool acquisitions?" Here are the comments:

"Should make a serious effort to allow more lead time, and to solidify designs, before releasing machine for manufacture."

"I think we need depreciation law changes and some help in this key industry."

"Keep the machine tool builders well-informed of their planned acquisitions in order to meet delivery dates."

"Allow for slightly longer deliveries."

"Automotive apparently slow to move on machine purchases. Aircraft and steel are getting orders placed for better delivery consideration. May make negotiations with automotive difficult unless they are willing to settle for less-popular machines."

"Automotive industry officials will be shocked at the extended deliveries when they start to place orders in first quarter of 1962."

"Don't buy on 'low dollar' before carefully reviewing proposals and checking designs offered."

"Agree among themselves on electrical specifications."

"We do not believe in the constant purchasing of used and rebuilt equipment. Machines reconditioned and/or rebuilt by responsible machine tool builders must be

considered first. Small organizations — so-called 'alley shops' — should not be permitted in this field, since they are completely upsetting machine tool rebuilding, leaving the problems of fixing and making good to the reputable machine tool builders, or the source of origin." ■

## Allis-Chalmers New Plant

(Continued from page 78)

ternal load while still on the conveyor carrier. At the present writing there are some 20 of these test stands, supplied by Control Engineering Co. The stands are instrumented to suit A-C requirements, equipped with fixtures and quick service connections for running the engines. An air starting motor is supplied to crank the engine, automatically disengaging when the engine has started. The hot test cycle is two hours.

Diesel engines are tested in a separate department on special test stands designed by the company. There are 34 stands in all, varying in size and absorption capacity to suit the entire range of A-C Diesels.

Each of the test stands is equipped with a Dynamatic dynamometer; and Honeywell instrumentation selected especially for A-C requirements. Diesel engines are tested for varying cycles, depending upon the size of the engine, the duration being about 3 1/2 hours on the average. ■

### Correction

*Ed. Note: In Part I of this series, The Whiting Corporation "TRAMBEAM" was incorrectly described as the "Whitney Tranbeam." This product is made by Whiting Corporation, Harvey, Ill.*

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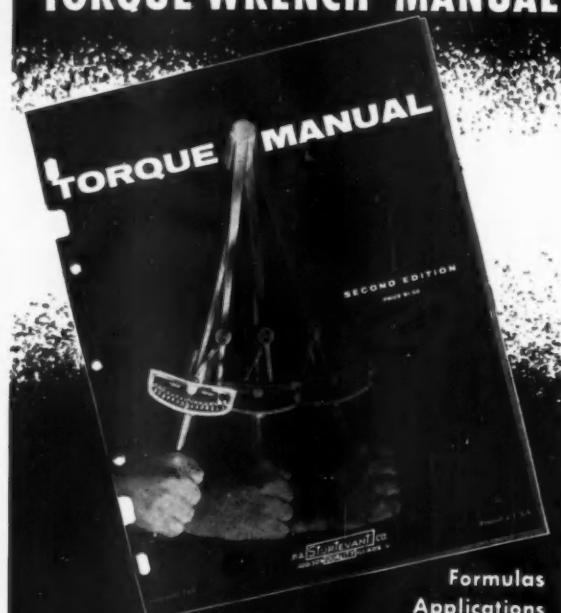
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ASSISTANT EDITOR

#### AI Index

AUTOMOTIVE INDUSTRY's editorial index summarizes all editorial articles alphabetically by subject along with page numbers and issues in which they appeared. Articles are listed under several major classifications with considerable cross-indexing for quick reference. Circle Inquiry Card number 1 for Volume 124 (January 1 to June 15).

#### AI Index

Circle Inquiry Card number 2 to receive index Volume 123 (July 1 to December 15).

#### Gas Regulators

A completely new, 40-page catalog on regulators for the accurate control of industrial gases in all applications has just been issued. This publication provides quick-reference charts which indicate the range and variety of Airco regulators. A cross referenced, illustrated layout—in which all regulators are classified according to use—provides a convenient way of finding information in the catalog. *Air Reduction Sales Co., A Div. of Air Reduction Co., Inc.*

#### Casting Bulletin

Catalog G-261 describes and illustrates high alloy casting service in the static, centrifugal and shell-molded categories. It lists the ACI nomenclature, metallurgical properties and broad uses of some fifty-five different alloys for the chemical, petrochemical and metal treating industries. Special emphasis is given recently developed alloy, HOM, for castings to be used in the 2100 to 2200 deg. F range, with limited applications at 2300 deg F. *The Duraloy Co.*

#### Degreasing

A new 4 color, 16 page booklet describes Trichlorethylene and Degreasing equipment. The correct selection of the vapor, spray or immersion methods of degreasing are discussed in relation to various applications. Photographs show several types of standard design and custom-built degreasing units, including a unit for continuous degreasing of cold rolled strip or spring steel. The manufacture of Trichlorethylene, specifications, purity standards and physical properties are described. *Uddeholm Co. of America, Inc.*

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## Original Equipment 15

A catalog on the fast moving original equipment parts for tractors, combines, hay bailers and other miscellaneous agricultural machinery has been published for the first time. This catalog lists, in easy-to-read form, all of the fast moving electrical systems parts for magneto and battery type ignition systems. Also that the fuel section contains regular carburetor and LP type system part numbers. The information was supplied by: Autolite Div. of Ford Motor Co., Fairbanks, Morse & Co., Marvel-Schebler Products Div., United Motors-Delco-Remy Div., Walbro Corp., Wico Ignition Div., Zenith Carburetor Div., Automotive Electric Association.

## Tolerance Rings 16

Tolerance rings for various industrial applications are discussed in a new 16 page booklet. Numerous charts are shown covering the various sizes available. Line drawings and photographs are used to complete the information and describe the areas where the rings are applicable. *Roller Bearing Co. of America.*

## Vacuum Metallizing 17

Vacuum metallizing—a simple, clean, low-cost method of depositing a thin film or layer of metal (or certain non-metallic materials such as silicon, selenium, or magnesium fluoride) on prepared surfaces of metal, glass, paper, or plastics, to yield either a functional or decorative coating is discussed in a new and comprehensive brochure. *F. J. Stokes Corp.*

## Slide Calculator 18

A shear selection packet consists of a new four page bulletin and a handy slide calculator. The bulletin, identified as VHS-61, gives design details and specifications for Verson's completely redesigned line of hydraulic shears. The slide calculator simplifies the computation of the tonnage required to shear all commonly used metals. It may also be used to determine quickly whether an available shear has sufficient capacity for a given job, or what maximum thickness of any type of plate can be sheared in an available shear. *Verson All-steel Press Co.*

## Design Manual 19

This design manual covers a complete line of manual remote controls as used on ships, in power plants, and industrial plants for valves. Included are dimensional sketches of all terminals. This manual is divided into 3 sections. Section (1) covers flexible shafting for use where there are a number of bends to make and includes valve couplings, remote operating terminals and handwheels. Section (2) covers standard rigid reach rod controls and Section (3) covers gear boxes including a 90° gear box and the new 300° swivel geared joint that operates in any angle from 0 to 300° making it ideal for use in sharp bends and for ease of installation. *Stow Mfg. Co.*

## Precision Casting 20

An 18-page booklet describes plaster mold casting, planar investment casting and how both processes can be combined to overcome important limitations of either process alone. The booklet is in two colors and contains thirty-five photographs as well as descriptive drawings and specific design data. An engineering table gives the specifications and properties of eight different nonferrous alloys. *Atlantic Casting and Engineering Corp.*

## Metal Spray 21

New two page literature discusses properties and applications of Colmonoy 75 and gives recommendations for its use in overlaying a variety of base metals. Use of the alloy in the Colmonoy Sprayweld Process is discussed in detail. This discussion covers such topics as surface preparation, application of Colmonoy 75 powder, fusing the sprayed overlay and finishing the fused overlay. *Wall Colmonoy Corp.*

## Ball Valves 22

Catalog No. 1200-A provides detailed information on a complete line of manually operated and pneumatically operated ball valves. Valves described range in size from  $\frac{1}{4}$  through 12 in. with screwed, socket weld, and flanged end models for temperatures from minus 150 to 1000 deg. F., pressures to 1000 psig, and vacuum to  $10^{-6}$  mm Hg. *Hill-McCanna Co.*

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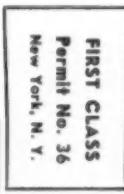
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## Fasteners 25

An attractive new bulletin presents graphically and concisely the Tinnerman line of Speed Nut brand fasteners. Consisting of 32 pages, the bulletin dramatically parallels each fastening principle employed in the major product line with actual applications and engineering data. The firm's popular

"J" type fastener, for example, is pictured in silhouette on a mechanical drawing of a typical application. It is also shown in close-up on an actual product with a large illustration of the fastener itself. A generous selection of popular sizes, each clearly defined in a dimensional chart, provides complete technical information for the design or purchasing man. The new bulletin also includes a section devoted to multiple-function fasteners, presented in case history style. *Tinnerman Products, Inc.*

## Automation 26

Case histories and descriptive literature on automated materials handling are included in brochure 614. The brochure outlines briefly, by example, how many companies are realizing profits from automation of their materials handling and the equipment available for this purpose. The brochure emphasizes that the idea of automated machines replacing manpower to effect savings is only a partially true concept. The greater savings of automation are reflected in the system itself, the ability to time and schedule, the pre-planning possible, controlled output and infallible operation. These, plus manpower, are the economical results of a properly installed automated system. *Barrett-Cravens Co.*

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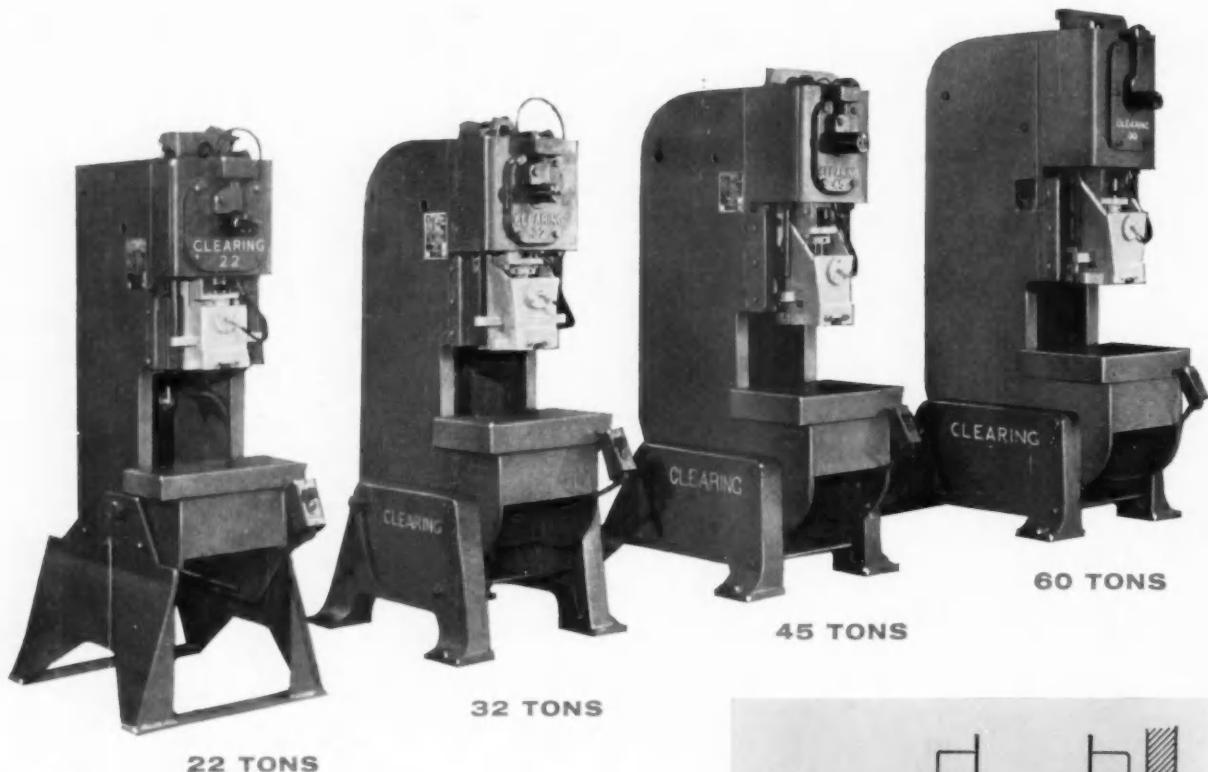


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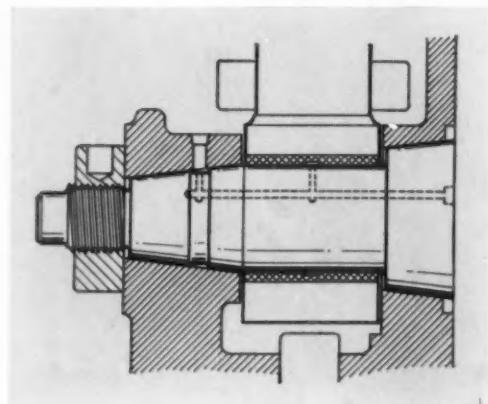
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The Clearelease mechanism makes it possible to unstick the press in a matter of minutes. A taper wrist-pin in the press slide provides instant release. Simply loosen lock-ing nut and tap wrist-pin in.



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